Iron Ore Reserves of Czechoslovakia, Yugoslavia,
Hungary, Poland, Bulgaria, Rumania, Albania, and Germany

Die Eisenerzvorraete der Welt
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Security Information

2. CZECHOSLOVAKIA (Atlas pages 67 to 69)

Czechoslovakia consists of the provinces of Sudetenland, Bohemia, Moravia, and Slovakia. Corresponding to this political boundaries we also distinguish three regions of deposits:

The first group of deposits, those of Sudetenland, are arranged in Table 132 according to age.

The ores of the smaller pre-Devonian magnetite deposits situated in the northern part of Sudetenland were in previous centuries smelted in charcoal fires at the site, but recently no attention has been paid to them because of their modest extent. In the northern Altvater (Hrubý Jeseník) mountains, on the other hand, numerous mines have been worked to a depth of 100 meters.

(Table 132)

In the area around Sternberg magnetite and red iron ores occur over an extent of 40 kilometers; these are of the same age as those of the Lahn-Dill region and belong in the same geological horizon. The pure magnetic iron ore contains 50 percent Fe and 15 to 20 percent SiO_2 and 15 to 20 percent CaO. As shown by analysis, ores of low iron content are very acid. They are of less value than the ores of the Lahn-Dill region, which today only exceptionally produces ores containing up to 45 percent iron.

New examination of the region between Sternberg and Bennisch in the last decade has produced very encouraging results. Boring and sinking tests showed the following composition on the average:

Table 1337

The deposits previously ~~ascertained~~ located on the western Schalstein range amounted to 1.78 million tons, on the eastern range to 1.83, ~~which~~ the two ranges together ~~to~~ contain 3.5 million tons. An ~~assumed~~ depth of 100 meters had been assumed, ~~taken here~~, at which point barrenness is generally supposed to set in. The latest borings, however, have shown the greatest ore thickness (5 meters) and the purest ores at a depth of more than 100 meters. Near ~~Bonnisch~~ Hohen Geroldseck alone an additional 500,000 tons, more or less, have been discovered at a depth of up to 200 meters. Therefore, ~~a multiplication~~ many times the previously established certain reserves of 3.5 million tons can be expected. Of course, one has also to count ~~with~~ on very acid ores in parts of the newly prospected beds. Because imports from Yugoslavia have stopped, the ores are now being extracted from the mines in greater quantities for smelting.

b. The iron ore deposits of Bohemia and Moravia, ~~similarly to~~ like those of Sudetenland, are grouped in Table 134 according to location, age, and genesis.

The Czechoslovak metallurgical industry relied for ~~providing~~ the necessary iron ores on two deposits in Bohemia, ~~on~~ one in the Pilsen-Prague Lower Silurian Basin and ~~on~~ one in the ore region of the Slovak Erzgebirge (Ore Mountains). The first has a length of 105 kilometers and a width of about 20 kilometers. ~~Taking~~ Assuming a thickness varying between 1 ~~to~~ and 10 meters for the ~~long~~ individual, lenticular pea ore beds, the reserves can be calculated at 308 million tons containing 102 million tons of Fe. Furthermore, the prospecting undertaken most recently has established that ~~the extent of~~ the deposit worth working is larger than was previously known. The composition

of the ores can be seen in Table 135.

[Table 134]

The ores occurring around ~~Hammerstadt~~ Vlastejovice and Nemecky Brod (now Havlickuv Brod) and ~~Deutsch-Brod~~ in Moravia and South Bohemia are of an entirely different composition; ~~supposedly~~ there are reported to be 3 million tons of magnetite pea ores in basic eruptive rocks. In Moravia, west of Erno, near Laschanko, unidentified brown iron ore deposits are found together with chlorite slate and calcite, ~~supposedly~~ occurring in small pea ores, having a thickness of 1 to 5 meters and reported in lenses they are thought to contain about ~~to an extent of~~ 25 kilometers, ~~and contain~~ 1 million tons.

c. Slovakia: The third large ore region of Czechoslovakia is composed ~~in the first place~~ primarily of the deposits of the former Hungarian County of ~~Zips~~ Spis and ~~Gomor~~ Gemer, which ~~had been~~ were assigned to Slovakia in the peace treaty following World War I; ~~and furthermore~~ it also includes the iron spar veins on the southern slope of the Djumbir (DUMBIER) Mountains of the Lower Tatra in eastern Slovakia.

[Table 135]

In the first ore region of ~~Zips (Szepes)-Gomor~~ Spis-Gemer the important mines of Kotterback (Kotterbach), Frakendorf (Prakovce) unidentified, Rostoken and ~~Dobschau~~ (Dobsina) (Dobschau) Schmollnitz (Smolnik), Iglo (Spisska Nova Ves), and Gollnitz (Gelnica) are located in the northern range, unidentified Gomor Deissholz, Rakos, Nadabula, Jossau, and Rudnik on Vassegy (Eisenberg) on the southern. The deposits are found in graphite, sericite, and other metamorphic slates, ~~in the vicinity of~~ surrounded by greenstone, gabbro, and porphyroids, usually ~~mostly~~ on the border between Devonian and Carbon. Here we are concerned

with two deposit formations, the true seams and the lumpy metasomatic spathic iron ore formations formed by ~~the displacement of~~ iron solutions which seeped through the calcareous secondary stones ~~by iron solutions~~ from the ore clefts. ~~In~~ Their ore composition (Table 136) ~~they fall somewhat below the~~ is inferior to that of the Siegerland by a few percent, as they contain on the average only 33 percent, more rarely 36 to 38 percent iron, and only 1 to 3 percent manganese in the raw ore. Roasted spar has 48 percent iron, if free ~~iron oxidized~~ of non-ferrous metals; the beds and veins have been formed in the upper depths on copper and iron pyrites, as well as on tetrahedrite. The ore territory extends ~~to~~ for a length of 100 kilometers with a width of 50 kilometers. Because of the irregularity of the deposit formation, the thicknesses vary between 1 and 20 meters. The ~~supplies discovered~~ reserves located here amount to more than 30 million tons.

/Table 136/

The second, ~~but~~ substantially ~~more modest~~ smaller ore formation, that of the iron spar veins on the southern slope of the Djumbir mountain range south of ~~Rosenberg~~ Ružomberok, is situated in an ore territory 18 kilometers long; ~~with~~ vein thicknesses ~~of~~ run from 0.50 to 1.50 meters, in the Suchy Valley occasionally up to 8 meters. Spars rarely contain more than 0.02 percent P (Table 137).

The total reserves of Slovakia amount to ~~36~~ 39 million tons with 12.8 million tons of Fe. However, after more thorough ~~examinations~~ explorations, considerably larger ~~ore~~ quantities can be expected. In the territory of the former independent Slovakia the following ~~was~~ quantities were produced:

1937.....767,000 tons	1939....766,000 tons	1941.....978,000 tons
1938.....770,000 tons	1940....862,000 tons	1942.....949,800 tons
		1943.....950,500 tons

/Table 137/

/Table 138/

More than half of the ores, 52 percent according to the latest data, ~~have been taken~~ were sent to Bohemia and Moravia (37 percent to the blast furnaces of ~~Witkowitz~~ Vitkovice and 15 percent to the iron works of ~~Trzynietz~~ Trinec). Hungary also received a considerable portion of the Slovakian output in the 34 percent that went to the Rimamurany iron works at Ozd, and only about 14 percent remained in Slovakia for the only blast furnace existing there, at Tisovce.

At the end of World War II the deposits transferred to Hungary were again returned to Czechoslovakia; thus the reserves and output data for 1938 listed in table 138 are again valid for the whole of Czechoslovakia.

/Tables 139 and 139a/

3 YUGOSLAVIA (Atlas, page 70)

Yugoslavia came into being through the union of Serbia and Montenegro with Bosnia-Herzegovina, and those parts of Austria and Hungary which were inhabited predominantly by Slav populations. It lost the form it attained after World War I and was broken up into Serbia and Croatia. The new boundary fixed in 1945 changed the economic conditions of the two countries. Thus, the former economic data and the distribution of the deposits regained their former validity as applied to the entire territory.

After the low of the years 1932 and 1933, the iron ore ouput of Yugoslavia showed a remarkable rise. Considerably more than half of the output had to be exported because of the lack of sufficient domestic blast furnaces; in 1939 Hungary received 221,000 tons, Rumania 98,000 tons, and Germany 63,000 tons of iron ore. The remainder was worked up into pig iron by six blast furnaces in the country itself, the necessary coke having been imported by water from England, through Dubrovnik (Ragusa), because Yugoslavia possesses in certain and probable coal reserves only 45 million tons of black coal and 4,680 million tons of brown coal. Black coal cannot be carbonized into metallurgical coke.

Although the pig iron production (Table 140) has risen in recent years, it still can cover only half of the country's needs which amounts in normal times to 240,000 to 250,000 tons of pig iron. Therefore, the country was always dependent on iron imports in the form of scrap and foundry pig iron.

/Table 140/

In order to work up the mined iron ore as far as possible within the country itself, the Yugoslav State founded the Jugo~~steel~~ "Celik" (Yugoslav Steel) ~~Industry~~ Enterprise ~~Combine~~, a sort of holding company comprising the State iron ores of Zenica, the iron works at Vares, the iron ore mines of Ljubija (near Prijedor), and various other iron ores and coal mines. This company was formed to bring about close cooperation in the development of the Yugoslav iron industry.

With the breaking up of Yugoslavia into the two sovereign states of Croatia and Serbia, the iron works of Zenice and Vares, the iron ore mines in Vares and Ljubija, ~~a considerable part~~ the coal mines in Zenica and Breza passed into Croatian ownership and were administered by the state-owned Croatian Mining and Metallurgical ~~Corporation~~ Enterprise. This, together with the smelting plant in Caprag, which also was predominantly state-owned, constituted the ~~kernel~~ nucleus of the Croatian heavy industry. With the planned expansion of the metallurgical plants near Zenica-Vares, 75 percent of the national demand should have been covered.

/Table 141/

Croatia, as a young ~~state~~ nation, had large financial expenditures. For this reason it endeavored to develop the iron ore output, not only to cover the needs of the country itself, but also to be able to export from Ljubija high grade iron ore with a low phosphorus content. In peacetime this export would have been directed, because of savings on freight charges, to the iron-hungry countries of Serbia, Rumania, and Bulgaria. Under normal conditions Germany would have derived no advantage

from this iron ore surplus, even though it considered it worthwhile to buy other ores from the old Yugoslavia. Iron ores low in phosphorus content were shipped to Germany only during World War II. Shortly before the outbreak of World War II England also attempted to become established in Yugoslavia and to acquire not only nonferrous metals but also iron ores. The purchase of mines was also considered. The transaction did not get beyond a preliminary stage as the war broke up the contacts formed. When the German Reich collapsed, Croatia had again to seek inclusion in the old state of Yugoslavia with its industrial plans.

/Table 142/

The Serbian State had retained very few iron ore deposits when the country was divided. Small magnetite deposits were prospected near Vrenja, also disintegration deposits near Suvo Rudište, laterite near Paprašište, and oölitic sediments near Kalja and Gubereva, but until now none of the deposits have become of any importance. The proved and probable reserves have been estimated at a total of 1.3 million tons with an iron content of 455,000 tons. The deposits near Zitni Potok and Rudna Glava were examined by the Germans (Reichswerke). The ore supplies ceded by Yugoslavia are today again included in the quantities as listed in Table 141.

4. HUNGARY (Atlas, page 72)

Hungary suffered very great territorial losses through the Trianon peace treaty, which ~~implied~~ meant a substantial loss in coal, iron ores, and other mineral resources. In the course of the reorganization of southeastern Europe, Hungary ~~had been~~ was able to regain 68,000 square kilometers with 4.1 million inhabitants; this, however, meant only a very slight change, from the point of view of mining and the metallurgical industry, inasmuch as Hungary, even in its new ~~shape~~ form, remained a country poor in ores. The losses were especially felt in iron ore mines. The ore regions of Zips and Sohl in the Slovak Erzgebirge ore Mountains together with part of ~~the county of~~ Gomor County, were incorporated into Czechoslovakia in 1920. To Rumania were lost the iron ore basin of Temes (Banat), ~~and~~ the ores of Karasch-Orsova-Severin (Krasso-Szöreny), and most important, ~~mainly, however,~~ the brown iron ore deposits of Hunyad County, ~~these~~ which had ~~having~~ been the largest in Hungary's possession. Out of all its former northwestern ore possessions, there remained only the low grade ~~quality~~ spathic iron ore deposits in Abauj-Torna, the spathic iron ore and brown iron ore of Rudabanya in ~~the county of~~ Borsod County (15 million tons), and a few valuable spars south of the Vashegy Mountain; part of Rosenau, Lucia-banya and Jaszomindszent (6 million tons).

Expressed in figures, this change in the structure of the country modified the iron ore possessions of ~~thousands~~ Hungary as follows: First, there were the original possessions, which included the following ~~deposit~~ reserves:

	(in 1000 tons)
Zips-Gömör ore mountains	59,600
Vajda-Hunyad deposits	18,531

[Table continued on following page]

Vasko-Dognaska, Banat	6,170
Bihar Mountains and Szekler Land	5,900
Northern part of Bosnia	20,700
	110,901

These possessions were distributed, after World War I, among the countries mentioned below in the following proportions:

[Table 143]

In November 1938, in the first Vienna award, part of ~~Upper~~ northern Hungary was returned to Hungary. Carpatho-Ukraine was returned in April 1939, and the second award brought back Northern Transylvania. However, this addition raised the iron ore reserves of the country only by an estimated 6 to 7 million tons, yielding about 320,000 tons of ore annually. This additional quantity was not sufficient to cover the needs of the country.

The loss of World War II reestablished the situation existing after World War I. It gave Transylvania back to Rumania, and ~~to~~ ~~Czechoslovakia~~ the territories ceded in 1938 to 1940, together with the iron and coal deposits, were returned to Czechoslovakia. To Hungary were left 16 million tons of iron ores, ~~and~~ approximately 100 million tons of ~~bituminous~~ black coal, and an equal amount of brown coal.

The only iron ore deposit, which is being worked today is located near Rudabanya in Borsod county; it is 5 - 6 kilometers long and 100 to 400 ~~kilo~~meters wide. The thickness of the ~~lenses~~ brown iron ore varies from 2 ~~to 20~~ meters, ~~increasing in some cases~~ to as much as 40

meters. A layer of marl and clay, about 10 meters thick, which covers the ore, is removed with steam shovels, and the ore is extracted by open-pit mining. ~~Imposed by necessity, it is being~~ attempted to utilize for smelting purposes a bauxite deposit at Tapolca near Halimba, which contains 18 to 30 percent Fe and amounting to 100 million tons. The iron ore bed with high manganese content near Macskamezö in the North Carpathians remained in Hungary and is also in operation (Table 145).

[Table 144]

[Table 145]

In spite of the great scarcity of domestic iron ore deposits the Hungarian iron and steel industry has been able to keep up with the general industrialization and should grow in the not too distant future into a decided competitor on the markets of the Balkan countries, if this development is not hampered by political conditions. This upward trend is also ~~supported~~ by the ~~enlargement~~ of a new smelting and steel plant near Mohacs on the Danube in the vicinity of the coal mines of Pecs. At present the Hungarian blast furnaces are supplied with coal only from the Soviet Union and no longer ~~with~~ the Yugoslav coal obtained heretofore. [NOTE: The Mohacs project was dropped early in 1949 because of the proximity of the Yugoslav border, and the plant is being built at Dunapentele (Sztalinvaros). Most of the coal mined by the Hungarian steel plants is supplied by domestic mines. On the other hand, the bulk of iron ore is imported from the USSR (Krivoy-Rog).]

5. POLAND (Atlas, pages 73 to 75)

Between the two World Wars the Polish state consisted of the Kingdom of Poland, detached from Russia, and the territories ceded to Poland by Germany after the Versailles peace treaty. No iron ore deposits of importance to the economy were located in these former German parts, except for bog-iron ore. In Galicia, which was taken over from Austria, the usable reserves are also extremely small. They consist of bog-iron ores, and the so-called Beskid ores, and of the insignificant deposits occurring west of Cracow. The main part of the Polish iron ore deposits are in the old Kingdom. The deposits found in this Polish-Russian territory are listed in Table 146 according to geological age.

[Table 147]

At present the first four groups of Table 146 have only theoretical importance. Not until we come to groups five to seven, in the Dogger, do we find the iron ores which constitute the most extensive and important mineral wealth of the country. There are three deposit districts here, Czestochowa in the west, Radom in the east, and in the south the single deposit of Olkusz. In all three districts a total of 13 clay-iron mines and 14 limonite (Atlas, pages 74 and 75) mines are being worked.

The remaining horizons, 8 to 10 in Table 146, rank below the three aforementioned groups in economic value. They are limited in extent, and their ores, though of better quality, are small in quantity.

The mining of the Czestochowa ores has not been developed in spite of the advantages presented by wide distribution, low depth, and the proximity of coal mines. In the mining of the ore beds of Radom, it has also been impossible to overcome the difficulties resulting chiefly from the mechanical quality of the ores, in spite of their greater thickness. The great expenses connected with the destruction of wide stretches of surface and the separation of the adherent clay from the ores, furthermore, the drying under cover or in drums, and finally the roasting caused relatively much trouble and high operating costs, so that the total prime costs were not in proportion to the value of the pig iron or to the price of available foreign ores. Constantly rising wages demand a higher degree of mechanization of the plants by mobile extracting and hauling equipment for open and deep mining. Because of the locally limited deposits and the resultant necessity of moving equipment, the mining is rather costly. The mining conditions are slightly better in the Radom area because of the greater thickness of the deposits, but still not sufficient to compete with foreign ores. Since it has to be taken into reckoning that the price of the home products will be greatly lowered by the import of Russian pig iron or Russian finished goods from the Ukraine, it is all the more necessary for the blast furnaces to smelt high-grade ore imported from abroad. Because of the close connection between Poland and Russia, the customs barriers will not hinder the import of Krivoy Rog ores. Whether or not the Polish iron ore production will be completely paralyzed because of Russian competition remains to be seen; however, it might be possible to continue the mining through the help of governmental subsidies or price increases.

In the last decade the Upper Silesian (Gorny Slask) metallurgical industry has several times considered the extensive use of Polish ores; but finally they always rejected the idea. A similar deposit in Germany is that of Bentheim-Ochtrup, (Atlas, page 162), which several large firms have tried in vain to exploit.

/Table 147/

The Polish iron ore production was developed in the last years to approximately 1 million tons. The greatest part, 60,000 tons monthly, comes from the Czestochowa area: the Radom area takes second place with 10,000 tons, whereas the production in the Dombrova Dabrowa area is only of about 1,000 tons. The production in the area of Tarnowice, +z [unidentified] which was resumed in 1940 after an interval of several years, has been increased to more than 2,000 tons monthly. Ore production in Poland had reached 700,000 tons in 1938, as against 77,000 tons in 1932. However, this is not in proportion to the pig iron production. Statistics of ore imports show that in 1935, for instance, 304,280 tons of high grade ore were imported, when at the same time 332,000 tons of iron ore were mined. These ores came from twelve different countries, mainly from Sweden, Norway, and West Africa. The Balkans participated only with a small amount from Greece.

Because of the difficulties the Polish iron industry had in securing raw materials, the Polish Government and the interested industries started a large-scale search for domestic iron ore. Inasmuch as wide areas of Poland have not yet been geologically explored, further discoveries seem possible. The daily papers and the scientific press report discoveries of high-grade iron ore deposits in the districts of Tarow [unidentified] near Tuchow (40 to 60 percent Fe), Vilnyus [now in USSR] (Bog-iron ore, 40 percent Fe),

Krozny (48 percent Fe), Chelm (roasted siderite 57 percent), Kielce, Sambor, and Rybnik. The occurrence of ones of the tertiary and quaternary horizons alone, amounts to more than 150 million tons, have supposedly been established by the Katowice Trust. However, no precise data is yet at hand concerning these new discoveries. It is certain that possibilities do exist for more extensive mining; however, these have been precluded for the time being by World War II.

Today the total amount of the known deposits in Old Poland is modest. The proved and probable quantities, as recorded on Table 148, amount to only 18 million tons. A generous estimate puts the possible reserves at 177 million tons, and thus just reaches third place among the ore reserves.

Table 148

On the other hand, the coal deposits of the country amount roughly to 150 billion tons, calculated according to the new boundaries. This amounts to 5,800 tons per capita, whereas truncated Germany now possesses only 3,360 tons per capita. This enormous wealth in coal fell to Poland after the termination of the two world wars, but no large iron ore deposits were thus obtained. There is the clay iron stone area of Kreuzberg extending to the old Polish border with 40 million tons (Atlas, page 66) which, if roasted, can yield 40 to 48 percent iron, after having been enriched to 30 to 37 percent iron by means of washing drums and excelsior apparatus (Table 147); but the high cost of extraction and dressing has not permitted the development of extensive mining as yet. Another deposit is the red iron ore bed of Schmiedeberg, together with the smaller adjacent deposits of a few tens of thousands of tons

of ore. (Table 148).

[Table 149]

Polish pig iron and steel production was quite important, since the industry consisted almost entirely of modern and efficient production and manufacturing plants (Table 149). It amounted to 5 percent of the capacity of the German blast furnaces, and its importance could be compared to that of the Saar industry. Polish production capacity has, moreover, been increased by the detachment of valuable coal wealth from Germany and by politico-economic cooperation with the Soviet Union. The creation of a heavy industrial center on the eastern German frontier is planned and has already been started with the cooperation of the Soviet Union and Czechoslovakia. It will be comparable in extent to the Ruhr. An annual output of 120 million tons of coal and a steel production amounting to more than 10 million tons is expected. The technical means are present. Coking coal is provided by the coal basin of Moravska Ostrava and Karwin near Tesin in Czechoslovakia, the other coals by Polish Upper-Silesia. The southwestern section of the Ostrava-Karwin basin does not contain the large beds of the saddle group as does the northeastern part near Bytom-Katowice, but contains chiefly the marginal group with more scattered and smaller beds, which, however, contain mainly coking coal. The known pit coal deposits worth working in Upper-Silesia, down to a depth of 1500 meters, amount to 150 billion tons, as compared with 34.2 billion tons down to 1200 meters and 22½ billion tons down to 2000 meters in the Ruhr area. The yearly yield of the Ruhr amounts to 94.3 million tons.

The Polish output was roughly 70 million tons in 1948 and should reach 77.5 million tons in 1949. There is in addition the Czechoslovak coal production of 18 million tons from the Moravian-Silesian area, so that the combined Polish-Czechoslovak heavy industry has at its disposal 95 million tons of coal, without obligation to deliver any to other countries, as is the case with Germany.

The iron ore, however, must be procured from a long distance. The large deposits of Krivoy Rog in the Ukraine will first be drawn on for the needs of the new combine. Besides that, there are the cheap ores of the Crimean Peninsula, extracted in open mining, and the manganese ores of Nikopol' on the Dnepr for mixing. Also Swedish ores will probably be in greater demand than at present. Extensive work employing large numbers of men is already in progress on the Danube-Oder Canal, which is being prepared for the transportation of the ore. Just as enormous is the project of the ~~Vistula~~ Wisła-Dnepr Canal, which Poland and Czechoslovakia have decided to build together and which will provide connection by water between Upper Silesia and the southern Ukraine. The Soviet Union furnishes the equipment for the new installations. Construction of the steel works at ~~Oleiwitz~~ Gliwice has already started and is expected to produce, as early as 1952, 500,000 tons of raw steel and 1.1 million tons of finished rolled steel products. The Czechoslovak steel industry reckons on a yearly production of 2 million tons of steel. The two countries, Poland and Czechoslovakia, will, in the near future, produce 5.1 million tons of steel yearly. There is, furthermore, a project for the construction of a new industrial center between Katowice and Moravska-Ostrava, with a yearly production capacity of 10 million tons of iron. As soon as these projects are executed there will be

created an economic power factor as large as that of the Ruhr area, which can be counterbalanced only by unification of the Western European industry. The already very large economic power of the East European states will be strengthened to a dangerous degree by this project.

6. BULGARIA (Atlas, page 76)

Of the Balkan countries, Bulgaria remains the poorest in iron. Although deposits of all kinds of iron ores have been found, except for one, they are of no economic importance. The only mine operated at all in Bulgaria is the magnetite mine at Blagovest near Krumovo, in ~~the District of~~ Yambol (Okolia). The ore is of contact-metasomatic-epigenetic origin, having developed between limestones and young porphyries at the beginning of the Tertiary period. It forms more or less large ore beds and contains 60 to 65 percent of iron free of sulphur and phosphorus. In the already examined portions of the deposit, which extends far beyond the region of Blagovest, there are 500,000 tons of ore. Approximately 6,000 tons were mined in 1936, 12,000 tons in 1937, and 25,000 tons in 1939; ~~which were~~ exported.

There is a genetically similar deposit near the shore of the Black Sea at Dobrich (Tolbukhin), north of Varna (Stalin). The mineralization took place in Paleozoic limestones in irregular forms, contact-metasomatically, as can be seen in the accompanying skarns and from transition forms of magnetization to magnetite in the limestone. Precise economic data are not available on this deposit.

(Table 150)

Hematite occurs in the Jurassic limestones on the slopes of the Balkan mountains. The most important deposits are located near the village of Gradets (~~District of~~ Sofia Okoliya) and near the town of Troyan on the northern slope of the Balkans. Among these only the deposit near Kremikovtsi has been previously mined on a small scale. Three other

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deposits are said not to have been opened up in spite of abundant reserves, because of ~~distance from~~ from transportation facilities.

Magnetite and siderite deposits, extending to 12 kilometers, are known in the vicinity of Chiprovtsi southwest of Kula, which, however, were abandoned as early as the 17th century. The deposit is unfavorably located as regards railways and the Danube, and for that reason has not yet been examined as thoroughly as its evident richness in iron ore would merit. Brown iron ores, such as gossan to siderite, are of little interest because of their small iron content. The amount of the probable reserves is evaluated at more than 1 million tons. A small percentage of arsenic impairs the unlimited use of the ore.

There are more magnetite ~~occurances~~ deposits in the western part of the country in the area of Burgas near the Black Sea. Two mines, Adela and Maria, possess together about 750,000 tons of ore, which can be brought to 65 percent through enrichment. Neither mine is being worked in spite of their favorable locations on the sea.

The sand on the shore near Burgas and Pomorie also is rich in magnetite, ~~which~~ It originated from Andesites of the Aytos Mountains and is, in spots, nearly black. One ton of ~~ore~~ sand contains 0.937 tons of ore, which when ~~prepared~~ dressed, has the composition given in Table 150. Its treatment is rendered very difficult by its close-grained texture and high titanium content.

The total reserves of the country opened to date reach roughly 2 million tons, with about 800,000 tons of iron, one half of this being probable and one half certain reserves. It is unlikely that these will

ever become of economic importance for export or for domestic consumption in Bulgaria. On the other hand, mining of ~~magnetite~~ ore could become a good source of income for the country, as it has gained in importance, especially ~~the magnetite~~ the deposit near Pasherovo [PAMCHAREVO].

Bulgaria uses annually 30,000 to 40,000 tons of iron in different forms, all of which has to be imported from abroad; this, however, does not include imported machinery. Because of the constantly increasing need for iron, the construction of two blast furnaces, with an annual capacity of 15,000 tons each, or of a large number of electric furnaces, has been considered. But without a large supply of high-grade ores and coking coal these projects will remain in the planning stage for the time being.

Bulgaria has produced (in 1000 tons):

1935	24	(15 tons Fe)	1938	17	(11 tons Fe)
1936	6	(4 tons Fe)	1939	62	(41 tons Fe)
1937	12	(8 tons Fe)	1940	30	(20 tons Fe)
			1942	25	(15 tons Fe)

7. RUMANIA (Atlas, page 77 and 78)

World War II also brought an increase in iron ore deposits to Rumania, at the expense of Hungary. According to Table 151, these deposits amount to 29 million tons. This represents 27 percent of the former Hungarian deposits (Table 151).

These former Hungarian possessions today form the basis of the Rumanian iron industry, which was heretofore restricted to a few poor ore mines, with the ~~appurtaining~~ refining furnaces, and about 20 iron foundries. Even today no real smelting industry exists because coal fit for coking is lacking. The country has concentrated its steel industry on the use of the ample domestic supply of scrap. The following summary shows the low capacity of the few small blast furnaces.

Rumania's iron works consist of:

2 blast furnaces with a combined annual capacity of 110,000 tons, near ~~Reschitza~~ Resita;

5 blast furnaces with a combined annual capacity of 168,000 tons, near Hunedoara;

1 small charcoal furnace with an annual capacity of 18,000 tons, near Lalan; and

11 Siemens-Martin furnaces and 3 puddle furnaces with a yearly capacity of 350,000 tons.

The few important mines for domestic consumption are in the Bihar and Transylvanian ore mountains and in the Pojana-~~Ruska~~ Rusca mountains. In the first are mainly the iron and ferro-manganese ores between ~~Vadu~~ Vascau and ~~Menyhasa~~ Moriasa region in the ~~Districts~~ of Bihar and Arad. These consist of

almost 40 percent brown iron ores ~~besides~~ plus spar and magnetite iron ores amounting to a total of approximately 1 million tons, half of which ~~has~~ have been opened up to date.

The area of the Pojana-Ruszka and adjoining mountains as well as the southwestern part of the ~~County~~ District of ~~Hunyad~~ Hunedoara and the north-eastern part of the ~~County~~ region of ~~Krasso-Szoreny~~ Caransebes is known as the District of Gyalar Siklari in the broader sense. The reserves here amount to 17 million tons. The Hungarian Treasury previously mined the ~~Hunyad~~ Hunedoara Range, ~~especially~~, the ores of which consist mainly of brown iron ore but also contain spar and magnetite ore in considerable quantity and of good quality.

/Table 151/

The richest ores are found in the limestone ranges of the Banat (Table 152), where 50 to 60-percent ores are not unusual. The main mining operations are carried out near ~~Vaskoh (Moravicza)~~ Oravita, Dognacska, and Ocna de ~~Fer~~ Fier near Reschitza. The reserves there amount to 7 million tons, of which roughly 1.8 million tons are certain and probable (Atlas, page 78).

/Table 152/

According to the official estimate of 1939, the total Rumanian reserves amounted to only 26 million tons containing 30 to 50 percent Fe. However, ~~having already~~ with 29 million tons taken over from Old Hungary, ~~29 million tons~~, the present reserves can be set at least at 35 million tons. Their

composition is shown in Table 152. The relatively well developed iron industry produces only 1/3 of its products from domestic ores (Table 153); 2/3 of the necessary ores are imported from Hungary. As the country possesses reserves sufficient for not much more than a few decades, the development of a large iron industry seems hardly advisable. The total coal reserve is also modest. It is calculated at 48 million tons of ~~bituminous~~ black coal and 2.7 billion tons of brown coal.

/Table 153/

8. ALBANIA (Atlas, page 71)

In Albania, iron ores have been found in all parts of the country. The most important sites are listed below. However, the data relative to the individual ore beds, except that of Pogradec, should ~~only~~ be accepted with caution because of the differing knowledge of the investigators. Furthermore, the listed ore deposits are not to be considered as the only ones in Albania, since, especially in the relatively inaccessible parts of the country, the work of prospecting and analyzing proceeds very slowly. Iron ores are known to occur at the following places:

Southern Albania:

Kolonje: extensive spar iron ore deposits,

Bojonices near Himara: high-grade minette ore,

Dhrovjan east of Valona: brown iron ore and iron pyrite in small quantities,

Sotire: brown iron ore and iron pyrite in small quantities,

Vajca and Smokthina: high-grade minette ore.

Central Albania:

Mumulishta near Pogradec on the west coast of Lake Ochrida: bog ore, oolitic ore containing 50 to 60 percent Fe, 3 percent Cr_2O_3 and 0.5 to 1 percent Ni, 20 million tons.

~~Monti Polisit~~: bog ore in small quantities.

Northern Albania:

Ceret: spathic iron ore and hematite, beds up to 3.5 meters in thickness,

Mola Valley near Domaj-Bare: bog ore, clayey ferriferous rock, very extensive ore bed with thickness of 3 to 5 meters,

Rubigy: hematite,
Skurarri on the left bank of the river Matil: 44.6 percent Fe.

The location of some of the deposits is uncertain, as even experts of the country were able to identify only half of the sites. Such unknown sites are:

Lamskon: 34.96 percent Fe,

Gyurma-Gurmarit: 43.87 percent Fe,

Cafa Barit: 43.31 percent Fe,

Martanesh on the Upper Mati Valley, west of Dibra,

Kriva Palanka
Sredorek in Sracin } in the Osogovska Planina mountains,

Dobrcevo south of Kartovo.

This country, which is still virgin as to mining, should not be entirely disregarded, even though this "country without railways" does not now encourage prospecting enterprises. The Italians had the intention of developing the Pogradec deposit to a yearly production of 1.5 million tons; however, military events interrupted the implementation of this plan.

TABLE 132

THE SUDETENLAND DEPOSITS

Consecutive Number	Stratigraphic Horizon	Location of Deposits (Mines)	Nature of Deposits
(1)	(2)	(3)	(4)
1	Presumed lower Silurian	~~Heckersdorf~~, Aupa, and ~~Upper Elbe~~	Regional metamorphic and Caledonian as well as varistically altered sedimentary marine segregation deposits of chamosite ores, modified in the magnetite layer.
2	Presumed Paleozoic	Jauernig in the Reichenstein Mountains and ~~Moravian~~ Altstadt, as well as Hermsdorf and Altvater Mountains	Presumed magmatic segregations of magnetite iron ore layers and oölitic ores in the ~~Moravian~~ Altstadt ~~Jauernig~~ gabbro-diorite ~~extension~~ range bordering on micaceous schists, ~~agmatites~~ amphibolites at Hermsdorf.
3	Lower middle Devonian		
	a. Western range of deposits	North Moravia: Goldstein, Weigelsdorf, Franzensthal, Nikles, Aloisthal, and Eisenberg on the March;	
	b. Central range of deposits	Zuckmantel, Einsiedel, Buchbergthal, Ludwigsthal, ~~Kirchle~~ Mohrau, Karlsdorf,	Iron ore formations of the Lahn-Dill type (However, greenstones and diabase tuffs are absent; see also Table 174, No. 7).

(1)	(2)	(3)	(4)
		Römerstadt, Bergstadt, ~~German~~ Deutsch Eisenberg, Finkaute, Pinke, Meedl, and ~~Moravian~~ Mährisch Aussee;	
	c. Eastern range of deposits	Seitendorf, Beynisch, Spachendorf, Raase, Christdorf, Brockersdorf, Bärn, Andersdorf, ~~German~~ Deutsch Lodenitz, Gobitschau, and Sternberg.	
4	Presumed Devonian	Goldenhöhe, south east of Rittersgrün, Freisnitz-Kupferberg south east of Weipert.	Contact and regional metamorphic sedimentary Devonian greenstone iron ore formations transformed in the varistic rock formation, predominantly with magnetite and with ~~younger~~ mar xcent mineralization through zinc blende and copper ores.
5	Lower middle Devonian	West of the March River at Quittein. ?	Limonite formations rich in Mn and P originating from siderite, with limestone in the roof and greywacke schist in the sill. Presumably a connecting member between a syngenetic Devonian iron ore formation (Lahn-Dill type) and epigenetic tertiary weathered deposits on the continent (Table 17b, No 7).

(1)	(2)	(3)	(4)
6	Paleozoic	Vein region in the eastern part of the Eisenstock-Neudeck granite, with continuation of the Riesenberg-Rehhübel range of veins at the Protasi mine and at the Theresia manganese mine near Platten, and with the continuation of the Red Mine range of veins at the Segen-Gottes mine at the deviation near Junghengst, southeast of Johann-Georgenstadt.	Ore veins originating from the varistic mineralization, with hematite, red iron ore, and frequently manganese oxide ores, predominantly at the eastern edge of the granite contact with the surrounding schist cover.

TABLE 133

COMPOSITION OF THE ORES FROM THE DRILL CORES AND PROSPECTING OF THE BENNISCH-STERNBERG REGION IN SUDETENLAND

a. Drilling b. Slitting test prospecting	Fe percent	SiO percent	CaO percent
a. Lodenitz 3	29.56	46.84	4.69
Andersdorf 1	43.36	23.72	6.86
Bennisch 6	28.82	41.77	1.50
Bennisch 13	33.59	25.64	11.37
b. Lodenitz 1	48.69	25.58	trace
Andersdorf 6	56.48	16.10	-
Andersdorf 21	39.96	38.84	trace
bennisch 6	50.27	16.54	0.52

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TABLE 134

THE DEPOSITS OF BOHEMIA AND MORAVIA

Consecutive Number (1)	Stratigraphic Horizon (2)	Location of Deposits (Mines) and Reserves (3)	Nature of Deposits (4)
1	Lower Silurian	Prague-Pilsen Silurian Lowland (see 1a to 1d) Total reserves 308 million tons proved and probable ores.	Sedimentary ore deposits, these being marine segregation deposits, which produce lower Silurian, mostly oolitic layers of iron silicate ores (chamosites) and less frequently red iron ores.
	a. Krusnahora layers = middle Tremadoc	Ouzky mine near Holoubkau Reserves 21.8 million tons proved and probable ores	Occasional iron ore layers in greywackes with hornstones and tuffs.
	b. Komarov layers= lower Arenig-Skiddavian	? Krusnahora and Zbirower deposit region with Sebesic, Rac, Mauth, and Ten 273 million tons probable reserves	Oölitic red iron ore layers as well as a locally existing thick chamosite layer in greenstone, and greenstone tuffs, and black schists.
	c. Osek and Kvan layers = lower Llandeilo	? Karyzek 6.6 million tons proved and probable, 0.8 million tons possible ores	Two iron ore layers superimposed on black schists, chamosite and hematite in the lower, limonite in the upper.
	d. Zahorany layers = upper Caradoc	Nucitz 8 million tons proved and probable, 13.3 million tons possible ores.	Oölitic chamosite layer in greywacke schists.
2	Presumed Paleozoic	Hammerstadt, Deutsch Brod, and Maleschau. Reserves of 3.6 million tons.	Magnetite deoposits, to be considered as intramagmatic ore segregation, occurring in gabbro and other basic eruptive rock within the range of the highly metamorphic moldaunubicums [moldavites?], with granite intrusions.

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(1)	(2)	(3) RESTRICTED	(4)
3	Presumed middle Devonian	GROSSBITTESCH ~~Graeber~~ ~~Bittesch~~ (Laschanko) ? Reserves of 1 million tons	A limonite formation rich in phosphorus, originating from siderite; presumably it represents a connecting member between a middle Devonian iron ore formation (Lahn-Dill type) and an epigenetic tertiary continental weathered deposit. (See Table 174, No 7).

TABLE 135 RESTRICTED

COMPOSITION OF THE IRON ORES OF BOHEMIA AND SLOVAKIA

(in percent)

Deposit	Kind of Ore	Fe	Mn	P	SiO_2	Al_2O_3	CaO	MgO	S	Loss on Heating
Prague-Pilsen Silurian Basin (Nuzitz?)										
Nutcitz chamosites	crude ore	35.54	0.05	0.90	12.52	7.75	3.35	2.28	0.27	19.78
	calcined ore	44.30	0.06	1.10	15.61	9.66	4.17	2.84	--	--
Zditz chamosites	crude ore	32.78	0.05	0.66	13.38	13.12	3.42	2.08	0.35	18.92
	calcined ore	41.79	0.03	0.74	21.56	13.17	1.76	1.28	0.20	0.54
Krusnahora red iron ore (1)	crude ore	33.80	--	0.50	14.80	--	--	--	--	--
	calcined ore	44.00	--	0.66	23.70	--	--	--	--	--
	brown iron ore	46.28	1.29	0.05	--	--	--	--	0.17	--
Maleschau	magnetite	58.04	--	0.014	12.66	0.66	5.88	0.85	0.11	--
Laschanko	brown iron ore	38-42	--	0.3-0.5	24-26	--	--	--	--	8.4-9.7
Klokotschi near Doubrownik	red iron ore	21.87	0.35	trace	50.25	trace	14.69	--	trace	4.13
Prislawitz near Deutsch-Brod	brown iron ore	50.48	--	0.34	14.92	--	--	--	--	12.85
Stankau	brown iron ore	47.24	0.25	0.37	13.16	1.64	0.20	0.12	0.34	16.34

(1) Northwest of Nutcitz near Czarnin within the Silurian basin.

TABLE 136

COMPOSITION OF THE SLOVAKIAN ORE MOUNTAINS IRON ORES
(in percent)

Occurrence (1)	Kind of Ore (2)	Fe (3)	Mn (4)	P (5)	SiO_2 (6)	Al_2O_3 (7)	CaO (8)	MgO (9)	S (10)	Loss on Heating (11)
Northern Range of Veins										
Hlo-Holopatak (Scepes)	spar, brown ore	44.19	2.37	0.06	21.60	0.06	1.10	0.22	0.06	--
	crude spar	39.43	2.02	trace	11.01	0.20	4.27	0.25	0.35	30.00
Rostoka	crude spar	36.00	1.50	--	9.00	0.50	1.00	--	--	30.00
	calcined spar	53.00	2.00	--	11.00	--	1.50	--	--	11.50
Göllnitz-Kluckno	crude spar	27.69	--	0.03	5.30	1.15	14.74	0.10	0.03	39.74
	brown iron ore	48.26	2.18	0.05	16.44	--	--	--	0.08	14.50
Kotterbach	crude spar	33.14	2.10	0.01	4.70	2.43	8.12	0.16	0.48	30.39
	calcined spar	51.34	2.71	0.01	7.37	4.16	9.23	0.45	--	--
Krombach-Slovinka	crude spar	41.5	2.00	--	--	--	--	--	--	--
Southern Range of Veins										
Nizna Slana	calcined spar	41.00	2.50	0.04	13.00	--	--	--	1.14	--

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Gugel. Dobsina	spathic iron ore	35.77	3.25	--	4.15	0.65	4.00	--	--	36.24
	brown iron ore	49.20	3.81	0.01	10.00	2.72	2.25	trace	0.12	10.95
	brown iron ore	34.19	3.16	0.52	35.34	3.04	0.04	0.04	--	8.10
	brown iron ore	30.12	1.90	0.08	43.14	2.97	0.55	0.08	--	7.68
Massorter ?	crude spar	34.86	2.88	trace	8.57	0.32	2.28	trace	0.05	37.79
Biengarten ?	crude spar	34.87	2.91	trace	4.65	0.42	3.85	trace	0.04	33.43
Bienfeld ?	crude spar	34.85	2.91	--	4.71	0.64	3.70	0.03	0.20	37.60
Altenberg	crude spar	34.31	3.06	--	4.89	2.62	3.37	0.03	0.14	36.47
Eisenberg	brown iron ore	48.60	3.16	--	8.05	2.54	0.32	0.41	0.018	14.60
	spathic iron ore	37.50	4.14	--	1.65	4.54	11.83	0.14	0.12	16.32
Rakos	brown iron ore	51.62	1.40	--	20.13	1.28	0.32	0.60	0.04	2.44
Szirk	crude spar	40.00	5.00	0.01	--	--	--	0.10	0.40	--
(Derno" Hungarian Drnava - Slovak)	brown iron ore	51.87	2.23	0.02	--	--	--	--	0.12	--

TABLE 137

COMPOSITION OF THE ORES OF THE SPATHIC IRON ORE VEIN RANGES IN THE DJUMBIR MOUNTAINS OF LOWER TATRA

(Atlas, page 69) (in percent)

Vein Ranges	Fe	Mn	P	SiO_2	Al_2O_3	MgO	S	Cu
1st range of veins in Jerabi Valley	33.5	2.7	0.024	9.99	--	--	--	0.1
2nd range of veins								
a. on the north slope of the Certovica	58.0	4.1	0.11	5.00	0.20	1.0	0.04	0.34
b. in the Bistra Valley	44.32	2.80	0.033	13.61	--	--	--	0.42
3rd range of veins in the Sucy Valley	42.48	--	--	--	--	--	--	--
	47.98	--	--	--	--	--	--	--

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TABLE 138

PRODUCTION AND RESERVES IN CZECHOSLOVAKIA (1938)

	Production in 1000 tons	Proved and Probable Reserves in 1000 tons
Sudetenland	--	10,000
Bohemia and Moravia	745	308,000
Slovakia	1,091	39,000
Czechoslovakia, total	1,836	357,000

The coal reserves of Czechoslovakia amount to the following:

Black coal

for the Moravia-Ostrau Basin	>5 billion tons
for the Schatzl-Schwadowitz Basin	0.080 billion tons
for the Kladno -Rakonitz-Pilsen Basin	negligible
for the Rosits Basin	0.030 billion tons
	>5.110 billion tons

Brown coal

for the Teplitz-Brux-Komotau Basin	>10.3 billion tons
for the Falkenau Basin	1.0 billion tons
for the Eger Basin	0.2 billion tons
for Slovakia	0.3 billion tons
	>11.8 billion tons

In 1937 pig iron production was distributed as follows:

Sudetenland	485,000 tons
Polish Olsa region	142,000 tons
Bohemia and Moravia	48,000 tons
Slovakia	
Total:	675,000 tons

For the further expansion of the blast-furnace industry, see section on Poland.

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TABLE 139

IRON ORE OUTPUT AND PIG IRON PRODUCTION IN CZECHOSLOVAKIA.
(in 1000 tons)

Year	Iron Ore	Pig iron	Year	Iron ore	Pig iron	Year	Iron ore	Pig iron
1913	-	1072	1930	1653	1437	1941	1687	1972
1920	1053	737	1931	1235	1144	1942	1575	1596
1921	801	577	1932	602	451	1943	498	1704
1922	313	335	1933	429	500	1944	484	1548
1923	675	817	1934	553	601	1945	276	576
1924	1174	983	1935	731	812	1946	1164	961
1925	1230	1166	1936	1090	1138	1947	1236	1423
1926	1420	1088	1937	1815	1675	1948	1459	1650
1927	1591	1260	1938	1836	1609	1949	—	1750
1928	1779	1569	1939	1432	1609			
1929	1807	1645	1940	1574	1620			

TABLE 139a

CZECHOSLOVAK EXPORTS AND IMPORTS OF [redacted] IRON ORES
(in 1000 tons)

EXPORTS					
Year	Iron ore	Year	Iron ore	Year	Iron ore
1913	-	1929	352	1939	-
1920	43	1930	254	1940	-
1921	33	1931	153	1941	-
1922	61	1932	82	1942	-
1923	100	1933	79	1943	-
1924	125	1934	93	1944	-
1925	82	1935	82	1945	-
1926	170	1936	74	1946	-
1927	264	1937	182	1947	-
1928	246	1938	-	1948	-

IMPORTS					
Year	Iron ore	Year	Iron ore	Year	Iron ore
1913	-	1929	1641	1939	-
1920	562	1930	1475	1940	-
1921	385	1931	1311	1941	-
1922	153	1932	183	1942	-
1923	830	1933	182	1943	-
1924	729	1934	272	1944	-
1925	825	1935	549	1945	-
1926	766	1936	555	1946	-
1927	748	1937	1500	1947	-
1928	1242	1938	1011	1948	-

TABLE 140

IRON ORE OUTPUT AND EXPORT, AND PIG IRON PRODUCTION OF YUGOSLAVIA
(in 1000 tons)

Year	Iron ore		Pig iron Production
	Output	Export	
1920	19	-	6
1921	16	-	13
1922	61	18	16
1923	244	199	24
1924	330	265	15
1925	139	152	35
1926	367	-	19
1927	336	320	23
1928	439	370	29
1929	428	388	31
1930	431	356	35
1931	133	27	38
1932	27	1	10
1933	47	25	31
1934	179	112	33
1935	235	181	22
1936	451	314	43
1937	629	500	50
1938	609	374	-
1939	669	385	114
1940	596	-	85
1941	523	-	51
1942	-	-	50
1943	-	-	50

(1) Today all of the iron ore is being exported to Soviet Russia.

TABLE 111

THE IRON ORE RESERVES OF YUGOSLAVIA

Deposits (1)	Kind of Ore (2)	Reserves, in Millions of Tons (3)	1940 Production in Tons (4)	Remarks (Atlas page 70 and Table 142) (5)
Vares (Bosnia)	metasomatic iron spar of the lower trias transformed into red and brown iron ore	20 - 30 proved 80 - 100 probable	108,000	Planned ~~Projected~~ production; 300,000 tons with 43 percent Fe
Ljubija-Prijedor (Croatia)	- same as above -	30 proved, 20 probable, including 9 million tons brown iron ore.	410,000	Brown iron ore 49-60, ~~max~~ 37 percent in the deep ~~depth~~, little phosphorus
Slavsko-Polje (Topusko) south of Zagreb	Brown iron ore, partly metasomatic	unknown	7,700	45 - 50 percent
Crnagreda	Brown iron ore with manganese ~~magnesium~~	unknown	shut down	----
Baljeva	Brown iron ore	unknown	limited operation	----
Tavornica [not located] near Jablanica (Herzegovina)	Magnetite	0.207	limited operation	43 - 56 percent Fe
Donja Vast (Herzegovina)	Red iron ore	0.2 - 0.400	limited operation	46 30-~~60~~ percent Fe, average 40 percent

(1)	(2)	(3)	(4)	(5)
In the Lika (Herzegovina)	Brown and red iron ore	7.6	limited operation	33 - 45 percent Fe
Serbia (central and northeastern mountain range)	Brown and red iron ore, magnetite	1.3 proved, 6.9 probable, 2.0 proved and probable	limited operation	Rudna Glava, Zitni Potek, Topola, and others.
Yugoslavia, TOTAL:		>168 million tons[1]		With 64.4 million tons iron content

[1] Other estimates go as high as 600 million tons: however, they are not based on any accurate data. Any additional reserves should at best be counted as possible reserves.

TABLE 142

ANALYSIS OF THE MAIN YUGOSLAVIAN DEPOSITS (percent)

I. Ljubija at Prijedor (Croatia)

Deposits	Kind of ore	Fe	Mn	P	SiO_2	CaO	MgO	Al_2O_3	TiO_2	S	Cu	Loss on Heating
a. Jazavac [not located]	brown ore	49.12	2.37	0.161	13.75	--	--	2.09	--	0.054	--	0.86
b. Zora [not located]	brown ore	59.43	2.68	0.221	2.80	--	--	0.34	--	0.026	trace	10.50
c. Adamusa [not located]	brown ore	54.58	2.37	0.280	6.85	trace	trace	0.334	--	0.007	--	10.56
d. Litica Stara	brown ore	57.46	2.05	trace	2.90	--	--	--	--	0.034	--	11.95
e. Litica Nova	hematite	66.70	4.59	0.124	5.84	--	--	--	--	0.027	--	---
f. Ciganusa	brown ore	57.52	2.64	trace	2.94	--	--	--	--	0.071	--	---
g. Dimaavo [not located]	brown ore	49.43	3.28	0.041	6.41	--	--	--	--	0.075	--	---
h. a to g	spathic ore	41.93	1.92	0.021	1.72	0.76	trace	0.167	--	0.109	--	32.10

II. Vares (Bosnia)

Deposits [not located]	Kind of ore	Fe	Mn	P	SiO_2	CaO	MgO	Al_2O_3	BaO	S	Cu
a. Drozkovac	red iron ore	54.30	2.58	0.31	11.20	1.83	1.74	2.20	0.85	0.23	0.01
	spar, crude	45.90	5.08	0.02	6.55	--	--	--	--	0.30	0.02
	spar calcined	57.66	6.17	0.02	7.04	--	--	--	--	0.01	0.08
b. Brezik	brown ore	48.70	2.00	0.25	6.28	0.70	0.39	1.35	3.03	0.42	0.26
	brown ore	48.70	2.02	0.03	6.48	--	--	--	3.03	--	0.04

II. Vares (Bosnia) -- Continued

Deposits	Kind of Ore	Fe	Mn	P	SiO_2	CaO	MgO	Al_2O_3	BaO	S	Cu
	spar	36.12	2.38	0.014	5.97	--	--	--	3.04	0.05	0.07
	spar	38.00	5.10	0.03	9.40	--	--	--	--	0.40	0.02
c. Przici	red iron ore	67.20	0.19	0.14	8.10	--	--	--	0.92	0.09	0.01
	red iron ore	65.07	0.53	--	4.14	0.48	0.26	1.00	--	0.04	0.01
	vivianite	61.20	0.11	0.075	6.05	0.35	--	0.69	3.10	0.16	trace
d. Smreka	red iron ore	40.37	11.25	0.26	10.15	--	--	--	--	0.06	0.05

III. Other Deposits in Bosnia ~~and~~ Herzegovina

Deposits	Kind of Ore	Fe	Mn	P	SiO_2	CaO	MgO	Al_2O_3	S	Cr_2O_3	H_2O
a. Fojnica-Visoko	red iron ore	54.20	trace	--	5.10	trace	--	2.45	--	--	--
b. Alesue [not located] - Ostrelluka	brown ore	40.05	2.06	trace	7.88	--	--	--	--	--	--
c. Klecka stena near Prozor	magnetite	61.09	--	0.31	8.30	0.96	3.35	0.70	0.16	2.50	--

IV. Serbia

	Deposits	Kind of Ore	Fe	Mn	P	SiO_2	CaO	MgO	Al_2O_3	S	Cr_2O_3	H_2O
a.	Karantin near Vardiste	brown ore	36.82	--	trace	26.70	trace	6.07	1.52	0.7	2.65	9.20
b.	Suvo Rudiste in the Kopaonik Mountains	Magnetite	65.80	--	0.09	3.10	--	0.21	--	0.08	0.60	--
c.	Kremici	brown ore	36.20	22.00	--	--	--	--	14.12	0.22	--	2.11
d.	Topola	brown ore	31.00	--	--	20.00	7.81	4.93	18.91	0.97	--	5.41
e.	Dobra	brown ore	24.50	2.80	0.16	41.32	--	--	9.27	0.15	--	8.85
f.	Majdanpek	magnetite	43.4	0.17	0.15	20.55	0.45	0.61	1.94	0.51	0.29	12.10
		brown ore	33.6	0.03	0.17	28.79	0.64	0.34	6.43	0.45	0.30	12.92
		Pyrites	42.11	--	--	5.12	--	--	1.35	47.83	0.48	--
g.	Rudna Glava	magnetite	44.66	0.30	0.09	25.00	3.60	0.90	4.62	1.33	0.35	1.10
h.	Zrnaika [not located]	magnetite	54.18	--	--	18.90	--	0.57	--	1.56	1.37	--
i.	Zidilje	hematite	58.70	--	0.18	3.80	0.21	0.26	0.16	0.28	--	11.73

RESTRICTED

TABLE 143

DISTRIBUTION OF THE ORE DEPOSITS OF OLD HUNGARY AMONG THE NEIGHBORING COUNTRIES
(in 1000 tons)

	Proved and Probable Reserves	Possible Reserves	Total Reserves	Share of Total Reserves (percent)
New Hungary	4,900	11,150	16,050	14.5
Czechoslovakia	21,248	37,140	58,388	52.6
Rumania	6,120	22,684	28,804	26.0
Yugoslavia	841	6,818	7,659	6.9
Old Hungary	33,109	77,792	110,901	100.0

TABLE 144

IRON ORE PRODUCTION, IRON ORE IMPORTS, AND PIG IRON PRODUCTION OF HUNGARY
(in 1000 tons)

Year	Iron ore production	Iron ore imports	Pig iron	Year	Iron ore production	Iron ore imports	Pig iron
1913	395	-	190	1934	69	149	140
1920	102	-	30	1935	192	267	186
1921	36	-	71	1936	279	356	306
1922	46	-	98	1937	315	233	358
1923	138	-	124	1938	298	459	335
1924	102	175	116	1939	644	454	413
1925	69	962	93	1940	649	355	432
1926	132	338	189	1941	813	-	445
1927	194	402	300	1942	718	-	420
1928	203	433	285	1943	838	-	421
1929	258	570	368	1944	428	-	296
1930	157	437	257	1945	36	-	44
1931	84	188	160	1946	133	-	160
1932	56	83	60	1947	264	-	308
1933	50	105	93	1948	300	-	370

TABLE 145

COMPOSITION OF THE HUNGARIAN IRON ORES
(in percent)

Deposits	Kind of Ore	Fe	Mn	P	SiO_2	Al_2O_3	CaO MgO	Cu	S	Loss on Heating
Görmösbanya	Red iron ore	42.39	1.87	0.16	--	--	--	--	--	---
Barka	Red iron ore	50.52	1.26	0.10	--	--	--	0.01	--	---
Rudobanya	Brown I.S.	48.06	2.91	0.01	10.10	2.24	2.42	0.06(1)	1.00	---
Rudobanya	Red iron ore	58.81	1.21	0.15	3.00	0.14	1.67	--	--	9.10
Telekes Felso	Brown iron ore	38.12	1.89	0.13	12.66	4.46	8.88	0.07	0.36	13.97
Telekes Also	Brown iron ore	54.73	3.96	0.17	3.06	0.89	0.98	0.03	--	9.50
Telekes Also	Red iron ore	42.89	2.05	0.01	25.10	0.55	0.54	--	0.03	8.10
Macskamezo	Manganiferous	23.65	24.40	0.81	15.30	--	--	--	--	--
North-east Carpathians	Brown iron ore	21.79	24.46	0.74	13.92	--	--	--	--	--
		9.60	32.87	0.30	6.90	--	--	--	--	--
		17.33	25.85	0.64	14.35	--	--	--	--	--

(1) BaS = 3.44 percent

IV. THE IRON ORE DEPOSITS OF THE GERMAN REICH AND THE RELATION OF ITS METALLURGICAL INDUSTRY TO DOMESTIC AND WORLD IRON ORE RESERVES

A. GERMANY'S IRON ORE DEPOSITS, ITS ORES AND RESERVES

(Atlas, pages 80 to 95)

This chapter on Germany concludes the individual description of the deposits of the world. By placing it at the end of the long chapters I to IV, it is intended to give the German reader the vantage point of a knowledge of world deposits, from which he obtain a better view of the place of his country in the circle of ~~interrelations of~~ consumer and supplier countries. Although the German deposits are of very slight importance as compared with the deposits of the world, the presentation of its deposits and its economy will be extended beyond the ~~proportions observed until now~~, inasmuch as the German reader will seek, in this treatise, information on even the smallest deposits of his country. The foreign reader will understand this special treatment accorded to one's own land.

The description of the deposits has been condensed in a tabular survey (Tables 161 and 161a), arranged according to stratigraphic horizons with the genesis and character of the ores shown in a special column. The expert is presented in this grouping with an always welcome summary of deposits of similar age, similar origin, and similar character. The tabulated arrangement permits inclusion of even the smallest German deposit in the treatise without making it overlong.

Tables 162 and 164 are closely related to table 161. The first of the two gives, with a completeness never before equalled, the number

of the mines and analyses of the composition of the ores with full rendering of all ore components. However, the reader must be aware in regard to analysis that the values, even where the samples were taken from entire shiploads or whole monthly outputs, are always values as of the particular moment, inasmuch as in nearly all of the mines in courses and downcast shafts the content of iron and phosphorus, ~~in~~ silica and ~~in~~ lime can change for better or worse. However, the fluctuations, whether up or down, will cause no major curve deviations, especially when the raw ore is first ~~subjected to preparation~~ processed.

Table 164 shows the iron ore reserves of the individual deposit regions. Here, as in all paragraphs of this treatise, no mention has been made of the reserves contained in the individual mines, in order to safeguard private interests. An especially large number of outline maps (Atlas, pages 80 to 95) assists in the understanding of Tables 161, 162, and 164. In the course of the subsequent text, special consideration will be given to the individual tables.

B. THE SIGNIFICANCE OF THE GERMAN ORE RESERVES IN THE ECONOMIC SITUATION OF GERMAN BLAST FURNACES

The basic raw material requirements of German iron metallurgy was firmly assured before World War I, ~~through~~ by the domestic iron ore output and ~~from~~ by the large ~~possessions~~ interests owned by German firms in nearly all important European iron ore regions. The Treaty of Versailles deprived the German economy of the greater part of its foreign possessions and ~~in the country itself~~ of the most important domestic ore deposit, i. e., of the Lorraine minette ore region. In so doing, it destroyed the basis of

the iron industry, which is so very important for the German national economy. More than 3.8 billion tons of minette ore were lost to France. Hence the German metallurgical industry lacked the former German yearly output of 20 million tons of minette ore besides the valuable imports from foreign mines controlled by German interests. Moreover, ~~through~~ in territories ceded in the East, Germany lost more than 130 billion tons of ~~pit~~ black coal. The remnant retained in Silesia had to be ceded wholly to Poland in 1945, so that the only important ~~pit~~ black coal fields remaining to the German Reich are those of the Ruhr and Aachen area with 46 billion tons to a depth of 1200 meters and 221 billion tons to 2000 meters.

/Tables 161 and 162/

This dependence was less perceptible as long as the German people possessed sufficient means to buy the necessary quantity of ore abroad. The supply acquired with foreign currency had later to be reduced as far as possible, and an attempt had to be made to utilize to the greatest extent the remaining small deposits to supply the domestic metallurgical plants.

The ~~part of the~~ iron ore deposits that remained in the possession of the German Reich after World War I ~~was absolutely poor~~ were almost completely lacking in valuable ores. Only the Siegerland spathic iron ore region, the brown iron ore deposit of Ilseder-Pein, the red and brown iron ore deposit in the Lahn-Dill area, the Chamosite-Thuringite ore deposit in Thuringia, and a few isolated small ore accumulations in other places could be taken into consideration. The rest of the German ores showed a metal content below the lowest considered worth mining abroad, except in England. The German ores

designated as poor iron ores, ~~partly~~ some of them third-rate ores, are found in large quantities in the Salzgitter ~~Heights~~ hill range and, in the Dogger region of Baden, Wurttemberg, and Bavaria, and emergency measures were ~~undertaken~~ devoted to their exploitation. Thirty new mines were developed, with great expenditure, and more than 1.5 billion tons of poor iron ores were opened up to substitute for the lost minette ore. However, the huge ~~work~~ project ~~did~~ did not ~~reach completion~~ become fully effective. The planned development of all German mines ~~for large-scale conveying capacity~~ for large-scale output was nearly completed as regards preparation and equipment, as well as open mining, when the war broke out in 1939 and the whole minette ore region was occupied by Germany. At the same time the road was open for the purchase of ores containing 45 to 50 percent Fe from Normandy, Anjou, and Brittany. Thus, the painstaking work of the last two decades for the development of the low-grade deposits became, to a great extent, momentarily useless. Suddenly the ore balance of the blast furnaces found itself completely changed. The new surrogate mines reduced their output program to one half of its previous size, in some cases even by much more; ~~the~~ operations were ~~repeatedly~~ shut down and only a certain ~~conveying-readiness kept up~~ small capacity was maintained, as for instance in Zollhaus-Blumberg, Gutmadingen, Vierzehnheiligen, Porta, Schandelah and ~~part~~ some of the Salzgitter mines.

[Table 163]

German blast furnaces again lost control over all foreign ores as a result of World War II; consequently the previous difficult situation was revived. Without the addition of valuable foreign ores to the ~~poor~~ low-grade blast furnace burden, the profitability of pig iron production

is endangered in practically all metallurgical plants, because impoverished Germany, in order to save foreign currency, must once again resort to such second-rate ores as it had relegated to third place among the reserves after the occupation of Lorraine. This large-scale reversion to lower grade reserves is expressed in figures as follows: After World War I, the German Reich possessed

(a) 309 million tons of first-rate, 1107 million tons of second-rate and considerable third-rate reserves.

This quantity was greatly increased by the development of the poor deposits. Bodies of ore were considered worth working even when a continuous ~~addition~~ of moderate extent was necessary. ~~After~~ deducting the amounts mined since 1919 and taking into consideration the newly opened deposits, the German iron ore reserve -- not its value -- rose thereby to ~~a stock of~~

(b) 444 million tons of first-rate, 2075 million tons of second-rate and considerable third-rate reserves (Table 164).

/Table 164/

These figures are listed for Germany among the world reserves in Table 1. A glance at this table shows that one deposit similar to ~~that~~ these at Newfoundland, Kiruna, Krivoy Rog or Kerch' is of greater value for the metallurgical industry than all German ore deposits put together, especially if the ores are valued according to iron content and not as to number of tons. It must always be kept in mind regarding the amount of the German reserves that only because of dire need ~~here~~ have the second-rate deposits been promoted to ~~these~~ the category of ores worth mining, and that in other

countries all these ores would be rated as possible ores and ores not worth mining. Only the 444 million tons of first-rate ores constitute the mainstay of the remaining heavy industry of the German Reich. The smelting of the other ores entails losses which must be covered by subsidies from corporations, because only large corporations could develop and keep up the emergency mines. The stated 444 million tons of ores worth mining will, except for some remnants, be used up first and will be exhausted in a few decades. The time will come when the emergency mines will regain their importance, namely, when the mining of the minette ore deposits will be extended in greater measure to siliceous ores (compare Chapter II, E, 1a) and the level of ores worth working will be lowered to a content of 20 percent Fe for limy, and to 25 percent Fe for siliceous ores. Strictly theoretically speaking, this moment would occur in France only in about 60 years. However, as Bichelonne-Angots' demand that the robbing of mines, which results in the collapse of hanging siliceous seams, be stopped appears to be supported by legal norms, it is possible that French siliceous minette ores will enter the European markets at a considerably earlier date. At this time, the situation of the ores which are worth mining in the minette region will be more similar to that of the emergency mines and will be in a more favorable position in the country itself. The ores now mined in the emergency mines, with the help of modest state subsidies, are not average products but the pick of the best poor iron ores; however, it is not a direct robbing of the mines in so far as additional mining of entire deposits is being avoided.

In 1938 Germany obtained 22 million tons of ores from abroad, which, taking an average content of 46 percent of iron, corresponds to

an iron content of 10 million tons. Had Germany wanted to provide these 10 million tons from its own deposits, it would have been necessary, reckoning with the average content of 29 percent iron, when (in the dry state) of the present certain and probable reserves, to mine an additional 31 million tons of ore, or a total of 10.5 (average output over a period of three years) plus 34.5 = 45 million tons, an amount which could not be completely reached because of the condition of the mines, quite apart from the fact that the metallurgists would not have the blast furnace space needed for this quantity of ore. Converted to iron content these 45 million tons would represent 13 million tons of iron. The certain and probable reserves contain 940 million tons of iron; thus, theoretically speaking, the ores now considered worth mining, including the emergency mines, would be used up in a mere 75 years. In reality, the exhaustion will occur in a different manner. Over a long period, Germany does not possess sufficient means to continue the mining and smelting of 2.5 billion tons of ores at a loss. In the near future scrap obtained from the buildings and machinery destroyed during the war will be utilized to improve the blast furnace burden. Besides this, however, Germany must spend foreign currency in order to purchase high grade ores from abroad for mixing with the domestic ores. Thus the life span of the iron reserves will be longer than 75 years. Before World War II the price of foreign ores amounted to 23.7 pfennigs for each unit of iron per ton of ore; at present it amounts to 55 pfennigs for domestic ores. Because of this, the prime cost for Thomas iron has risen from 50 Reichmarks in 1932 to 96 in 1946. A reduction of costs can be achieved only if the blast furnaces can realize a higher efficiency.

This ~~is done in the blast furnace plant~~ by smelting high grade ores with scrap. Therefore, it is necessary that Germany hold back ~~with~~ the sale of its scrap to foreign countries, because each ton of scrap sold makes the import of at least 2 tons of high grade foreign ore necessary. Furthermore, the production of one ton of pig iron from scrap requires only 450 kilograms of coke, as against 850 kilograms if Swedish ore is used. For the smelting of ~~purely~~ German ~~emergency~~ ores, 1400 kilograms are needed. This should be compared ~~to~~ the policy of the United States for the past twenty years regarding the sale of its scrap (see page 23). Owing to the use of blast furnace charges which are perfect from a metallurgical engineering point of view, the Ruhr region, according to Table 163, produced 1 million tons of pig iron annually with 2 to 3 blast furnaces, an efficiency ~~of utilization~~ never before reached by any other heavy industrial region. However, this table also shows what very disadvantageous results are obtained by using poor German iron ores exclusively or as an addition, ~~in the mixture for~~ furnace charges. Pig iron smelted from poor acid iron ores ~~only~~ requires 12 blast furnaces of 840 cubic meters ~~holding~~ capacity, ~~for the production of 1 million tons accordingly~~; Germany produced the cheapest pig iron before World War II ~~and~~ would achieve just the ~~contrary~~ by using exclusively domestic ores for furnace charges; ~~namely~~, it would produce pig iron at the highest prime cost.

/Table 165/

/Table 166/

From 1936 to 1938, Germany's imports of iron ores were nearly ~~as~~

equal to ~~large as~~ those of all other importing countries combined and amounted to 46 percent of the total imports of all the producing countries of the world. (Table 166). England, Belgium, and Luxembourg also suffer from their dependence on third ~~supplying~~ countries for supplies; however, they all ~~may~~ can overcome this deficiency by otaining ores from their colonies or from mines owned by friendly neighboring countries. This great dependence on the willingness of foreign countries to supply Germany with ores has caused and ~~is permanently causing~~ continues to cause economic uncertainty; it also compels concessions as regards delivery to the supplier country ~~supplying the~~ of raw materials and semi-finished products which are very necessary to ~~the~~ Germany ~~country~~ itself.

C. GERMANY'S POSITION AMONG ~~RELATION OF GERMANY TO THE INTEREST SPHERE OF~~ THE ORE-CONSUMING AND ORE-SUPPLYING COUNTRIES OF THE WORLD.

Before World War I two-thirds of the ~~smelted~~ ores smelted in Germany originated from German deposits and only one-third had to be imported from abroad. The ~~mining of the~~ great iron ore deposits of Sweden, northern Spain, Newfoundland, Tunisia, Algeria, Brazil, Norway, and southern Russia could be ~~conducted~~ mined on a large scale only if England and Germany bought the ores. Furthermore, the British competition was not too pressing because of the slow development of ~~the~~ the British iron industry. After World War I the relation between ~~The complete change in~~ output and imports was reversed (Table 168), ~~made itself felt after World War I~~. Because Lorraine had reverted to France, two-thirds now had to come from abroad and only one-third from domestic output. The change in proportion was even more unfavorable regarding the German ores if measured by iron content; the domestic quantities amounted to only one quarter of the German consumption.

It has already been repeatedly mentioned that the use of German ores had to be cut down for economic reasons. These are briefly recapitulated in the following:

The German ore, with the exception of the Siegerland rhodonite, has a low iron content and a high silica content. It produces relatively large quantities of slag in the blast furnace; moreover, it requires a large amount of coke. It ~~does~~ not afford of high transportation costs because of dead weight, and cannot obtain high prices because of low iron content; prices, however, cannot be reduced, because the miners have to be paid living wages. Only the financial connections between the mines and the metallurgical plants have made the payment of such wages possible. Nevertheless, ~~they were unable~~ to prevent the constant ~~shrinking of ore~~ of working mines. The great number of small mines ~~renders it more~~ difficult to fulfill the demand of the metallurgical plants for a uniform composition of the ore ~~deliveries than is the case with~~ foreign ores, ~~which yield~~ uniform blast furnace burdens. Furthermore, the latter ~~had~~ either only a very low phosphorous content, for Bessemer smelting, or a rather high one for the Thomas process, which, by yielding the Thomas slag, provides agriculture with urgently needed fertilizer.

/Table 167/

Between the two World Wars, the most favorable Thomas mixture for the German blast furnaces of the Ruhr was a blend of Swedish ores, Lorraine minette ore, and ores from Normandy and Wabana, ~~partly~~ supplemented with ~~ores~~ from Spain, Marampa, and North Africa. This blast furnace charge needed only a slight addition of lime ~~to~~ and produced an

especially low proportion between iron and slag. This is why the German blast furnace operator is especially concerned today, because of the foreign currency shortage, about providing the metallurgical plants with these ores.

[redacted]

The leading exporting countries (Table 167) were Sweden, France, Luxembourg, and Spain, followed by Newfoundland, Algeria, and Sierra Leone, and finally countries exporting only small quantities, such as Spanish Morocco, Greece, and Russia. How far the supply can be obtained in the future from the most important exporting countries, and whether or not Germany can receive ores in former quantities and qualities are problems to be further examined in the following chapters, by taking up the countries individually.

/Table 168/

/Table 169/

1. Sweden - Norway - Finland

Sweden has always viewed with a certain anxiety the development of the German emergency mines, and saw in an assured supply of Lorraine minette ore a great danger to the ~~thriving existence~~ continuance of its Lapland ore exports. In fact, the trade lost 40 million Swedish crowns during the two years of the German depression (1931 - 1932) and by that loss consumed entirely the profits of the years 1928 - 1930 and 1933 - 1935. As long as Swedish ores are available, Germany will endeavor to secure

those to increase the efficiency of its blast furnaces; however, the clearing transactions with third countries or currency problems might temporarily necessitate another ore supply source. The German financial authorities had no [illegible] foreign currency for the import of the iron ores. In 1937, for instance, Germany imported a total of 20 million tons of ore at a value of approximately 220 million Reichsmarks. However, the currency outlay for the imports were made up many times over by the exports of iron products. In 1936 these exports brought substantially more than 2 billion Reichsmarks worth of foreign currency. If the value of the imported raw materials containing iron, (i. e., besides ores also scrap and pig iron, amounting to 400 million Reichsmarks) is deducted from this, there still remains a surplus of more than 1.6 billion Reichsmarks. Of course, it would have been advantageous if the 400 million Reichsmarks expense in foreign currency had not been incurred; however, it was for the purchase of high-grade ores, the utilization of which made maximum furnace efficiency possible, and thereby contributed substantially to the export surplus of 1.6 billion Reichsmarks.

/Table 17/

For the purpose already mentioned, [illegible] the cost of its large extracting and transportation equipment, Sweden had endeavored not to let the amount to be delivered decrease too much, as prosperity of the country depended [illegible] on its trade with Germany, which for a long time had been Sweden's best customer. In the years to come, England will take Germany's place as an ore buyer, [illegible] However, Sweden will appreciate just as little being

dependent on England ~~as an ore buyer~~ as formerly being dependent on Germany, especially since ~~the more so as~~ England has at any time the possibility of ~~in~~ with its world empire, ~~in~~ Newfoundland and Sierra Leone for example, of counteracting pressure in regard to ~~output~~ deliveries and prices by ~~managing in~~ importing ores from these countries. So far, Sweden has provided only 1 to 1.5 percent of England's total imports ~~in~~ of iron ores, whereas Sweden's share in German iron ore imports amounted to as much as 66 percent in normal times.

The development of the British metallurgical industry and the consequent increase of British imports, ~~connected with this~~, which ~~should be mainly~~ is supposed to be covered mainly by Swedish ores, (see Chapter II, B, 1), plus the intensified demands for Swedish ores in the United States, Poland, Belgium, Luxembourg, and even France (with plans to import Swedish ore in order to save coal) so rich in ores, ~~has for the purpose of saving coal~~, all further narrow the formerly wide possibilities in the German-Swedish ore trade. In addition to this, the Swedish government considered a plan for cutting down its ore production because of the probability that no new iron ore deposits of importance can be opened up in Lapland or Central Sweden. If this plan were carried out, ~~the~~ future exports would be limited to the following quantities:

1948	8.0 million tons	1950	7.7 million tons
1949	7.9 million tons	1951	7.5 million tons

and thus ~~the~~ Germany's chances ~~of Germany to be~~ of being included among the consumers for ~~of~~ Swedish ores seemed to ~~become~~ be very slim. However, Sweden ~~decided~~ withdrew from the above plan in favor of its currency economy, and not only did ~~it~~ not lower its export quota but, as shown in the chapter on Sweden, even increased it by 11 million tons for Lapland and by 1.2 million tons for Central Sweden. As early as 1947, Sweden realized, from its trade

balance and rapidly diminishing foreign currency stocks, that its best customer, which had provided it with more foreign currency than all its present customers put together, except for the British world empire. Therefore, Sweden as early as 1948 contracted with Germany for an ore delivery of 3.5 million tons in 1949, to revive the smooth and, for both parties, previously promising business connections. Lapland provided 2.8 million tons and Central Sweden 0.7 million tons out of the 3.5-million-ton shipment.

The Norwegian government, like that of Sweden, considers as important the conservation of the country's mineral wealth; however, the resistance against exploitation of mining by foreigners runs along calmer lines than in Sweden, because the poorness of the Norwegian iron ores has presented no special inducement for the acquisition of iron ores or deposits; the risk involved in the development of a large mining industry and dressing plants for siliceous iron ores containing 30 percent of iron has been too great. The example of Sydvaranger, which became profitable only after many years of struggle, and that of Dunderland scared foreign firms away, and the small mines with high-grade ores did not offer sufficient return on the invested capital. The Norwegian mining law added to the difficulties of the entrepreneur by its compulsory operation clause, according to which mines which were not put into operation within three years, or which were closed down, reverted to the state without indemnity. Further, Norway levies an export duty of 25 Öre per ton of iron, this, however, more from a financial than a politico-economic point of view. This regulation also applies to the ores shipped from Sweden through Narvik. As long as the duty is not more than 25 Öre it does not have a detrimental effect upon the purchase

of fairly large quantities of Norwegian ores for the German blast furnaces nor on Norway's mining itself. As explained in Chapter III, A 2, German firms took part in the operating of individual Norwegian mines or in the marketing operations.

With the exception of Sydvaranger, Norwegian iron ore mining is for the present of no special importance to Europe. If, however, after World War II, the non-phosphoric iron ores of Spain and North Africa are no longer available to England and Germany, then there should be a greater demand for Sydvaranger ores, and some of the mines at present shut down or employing only a few miners, such as Sörreisen, Salangen, and Dunderland, should again be given greater consideration, once the bitter ~~dressing~~ experiences ~~have been overcome~~ in dressing Sydvaranger and Dunderland have been overcome. As the Dunderland Iron Ore Company in Ranen, whose capital was ~~wholly iron~~ formerly in British hands, closed down its mines at the beginning of the war for the sole reason that its yearly output of iron ore concentrates, about 200,000 tons, had ~~so far~~ been shipped exclusively to Germany, it seems unlikely that a renewed German demand for ores would be refused, even though a change of ~~proprietor took~~ ownership has taken place in the meantime (see Chapter III, A 2). The transfer of ~~the right of possession~~ ownership to the Norwegian state, together with the planned ~~joining~~ merger with the neighboring Elsfjord fields, will no doubt retard the resumption of the ore ~~transports~~ shipments; however, it should not be difficult to come to an agreement with the new proprietor in view of the large reserves of the Dunderland fields. Generally, ~~it~~ the fact has to be reckoned with that the further development of the Norwegian mining industry is possible only in ~~connection~~ conjunction with ~~far-reaching preparation~~ extensive dressing operations and will benefit exclusively the bessemer blast furnaces.

Finland's iron ore reserves, amounting to 80 million tons, are unfavorably located for transportation, have mostly a low iron content, an unfavorable phosphorus percentage, a high residue, and at present have no prospect of gaining world importance. Furthermore, since World War II, Finland has closer economic ties with England and the USSR than with Germany; otherwise it might happen that one or another of its deposits would be developed with German assistance.

2. Spain

In Spain, the right to dispose of minerals has been removed of minerals; said right is reserved to the state. Rights are awarded to a concessionaire upon payment to the state and the community of immense amounts for taxes and duties. Two different taxes are levied. One is the field tax, according to the area of the grant (6 pesetas per hectare), without consideration as to whether the field is worked or closed down. The other tax takes 3 percent of the gross value of the ore produced. Further, there is an export duty on iron ores and another payable into the equalization fund mentioned in Chapter III, B, 1.

The community demands, as real estate tax, from one quarter to one half of the state tax on the ore value or a direct percentage of the same. Besides these there are also various small taxes for transport, shipping, dividends and stamp fees. The new Spanish mining law, issued in the middle of 1944, brings added difficulties for the mine contractor, besides retaining the former restrictions contained in separate decrees. The mineral wealth, being the property of the people,

is, now as before, reserved to the state, which can exploit it directly or can transfer this right to a third person. Payment of the concession fee and the beginning of operations are made ~~duties of~~ the person to whom the right of prospecting has been awarded. As once in Prussia, before the General Mining Law of 1866 came into effect, the principle of managment exercised through economic state control and by directing the total output according to the economic interest of the nation has been introduced. A limitation of "~~overcommitted~~ excessive mineral exports" in favor of domestic industry has been provided. The awarding of a concession to foreigners is no longer permissible. Financial assistance will be accorded by the government in certain instances and probably will have to be claimed very often in the future.

This mass of legal limitations and taxes, together with the production and export difficulties caused by the civil war and the Second World War, have reduced considerably the large number of ~~noteworthy~~ productive mines. In 1918, 430 mines ~~shipped~~ produced ~~in production~~ of 4.7 million tons, whereas there are now only about one quarter of that number producing 800,000 to 900,000 tons. In spite of this, Spain will not relinquish the control of exports and will not soften its attitude ~~before~~ until its metallurgical industry has been developed to the planned production capacity ~~of~~ and a stock pile of raw materials, mainly ~~in~~ high-grade iron ores, has been assured for many decades.

It is of no consequence whatever in delivery contracts with Spain in what order of succession the ore contracts are signed with the mines. In practice, it has no effect on export whether or not large ~~ore~~

quantities have been sold at set prices by the mines. Only those ores come ~~under consideration for~~ export ~~purposes~~ for which an export license (guia) is ~~given~~ issued, and the latter can just as well be ~~given~~ issued for ore sold the day before as for the arrears on a contract that was signed a long time ago, and ~~each time for any~~ quantity decided upon by the Ministry of Commerce. The signing of an ore contract gives no ~~security~~ that the mine will fulfill it. In most cases, requests for export of calcined ores are promptly approved as long as the export quota is not yet exceeded. On the other hand, ~~such~~ requests for rubio ores have, since the middle of 1932, ~~hardly~~ been approved ~~for any worth mentioning~~.

Only two circumstances can induce Spain to relax the limitations ~~of~~ its export ~~controls~~. When the iron ore deposts located close to the coast have been exhausted, then the mine fields situated far from it, which have been little noted until now, will have to be used to supply the country and for export. Extensive transport facilities are needed to connect them with the coast or with existing lines; the domestic mines lack the necessary capital and will hardly be able to obtain financial backing from ~~outsiders in Spain in~~ their present low profitableness. ~~This is~~ the moment when foreign heavy industry will be ready to step in, if the government is willing to meet the condition of assuring the export of high-grade ores over a long period. The other circumstance is the lack of metallurgical coke, and because of that the dependence of the country on the coke supplying countries, England and Germany. As soon as Spain starts becoming independent in the production of pig iron and steel it will have to relax its strict limitation of ore

exports in order to obtain coke supplies. However, the unrestricted activities of foreign heavy industry in Spanish iron ore mining would be over for all time, as in Sweden. This goes also for Spanish Morocco, even though a certain leniency can be observed there in regard to the allotment of iron ore, mountings. With its remaining weak financial and production resources, Germany must thus endeavor to assure itself a modest place on the shrinking Spanish ore market. It will not be able to regain in Spain its strong consumer position of the last decades. A similar limitation must be taken into consideration as regards Spanish Morocco. Here the demand will be great because of the decline in the output of the Spanish mainland, and in view of the modest ore reserves, only a meager portion of the requirement can be expected.

3. Lorraine, Luxembourg, Normandy, Anjou, and Brittany

Germany had, as shown In the last normal years before World War I, a yearly iron ore consumption of barely 40 million tons with an iron content of 17.7 million tons, this calculated on the basis of an average content of 46 percent of iron (Table 168). The peak production was reached in German Lorraine in 1913, with 21.136 million tons, with an additional 2.3 million tons imported from Luxembourg, so that the German metallurgical industry could receive, at best, 23.5 million tons of minette ore annually. In 1929, in spite of limited mining activities, France produced 17.988 million tons of minette ore in the former German part of the minette ore region. Of this, Germany received approximately 3 million tons. This quantity was raised to 7.8 million tons in 1936 and remained at this level until World War II broke out.

~~The extension of~~ French iron ore production has been further developed in the meantime. Before and during the war, France, with German assistance, fully developed the great mineral ~~treasures~~ wealth of Normandy, Brittany, and Anjou. The former German ~~operation~~ around minette deposits ~~has been enlarged~~ have been further exploited by the opening up of new shafts ~~mines~~. The mines of the Pyrenees have also ~~participated in the subsequent of the~~ contributed to the increase in production. Therefore, France is today capable of producing 60 million tons of ore, if it can ~~muster~~ recruit the necessary miners. The need of the domestic blast furnaces amounted to 30 million tons after World War 1, leaving approximately 30 million tons available for other purposes. To leave this quantity unmined would mean a great loss of income for the mines and would also lead to an increase in prime costs, which France could not disregard without permanent damage. The annexation of the Saar regions brings to the French heavy industry a substantial increase in coal mines and blast furnaces and raises the domestic consumption of minette ore. Further, 9 to 10 million ~~tons from~~ of the 30 million tons go for export to Belgium and Luxembourg. To this should be added the development of the metallurgical industry in accordance with the Monnet plan to twice the production of 1947. Thus, at a first glance, not much of the second 30 million tons is available for other use, especially if the ~~mustering~~ recruiting of the miners should not succeed ~~to a full extent~~ completely. However, France will continue to export ores until the Monnet plan is completed. Also available for export are the quantities which, because of the preference given to Swedish ores, are not bought by Belgium and Luxembourg. The new production plan in France as well as in England provides for the use of high-grade foreign ores. Because of this,

a certain additional quantity of ore will be available for export. In order not to incur a financial loss by limiting the output below full capacity, the French government found it convenient in 1949, for the first time since World War II, to agree to export 800,000 tons of minette ore and North African ores to Germany against payment in semi-finished goods.

Before World War II France never renounced the control of exports and always took pains to receive an equivalent in raw materials for the limited amount of ore exported. The last German-French trade agreement was based on this principle and provided for exchange of German coke for French ores. France, ~~as well as~~ Sweden, will not wish to renounce such a coke or coal agreement ~~for~~ long-range contracts, while Germany, because of the very limited coal supplies in the east and the west of the country, will not be able to satisfy in full ~~and for a long time~~ her former contract partners in regard to coal supplies. Whether these circumstances will lead to the cutting off of exports to Germany depends on the willingness of the other consumer countries to supply the full amount of the necessary coal. Lorraine will always remain the most convenient ore supply source for Germany on the European continent. ~~The~~ An ample supplying of the Ruhr region ~~with minette ore~~ would be desirable if only for the reason that the completely one-sided ~~loading~~ of the means of transportation for coal shipments going west and southwest ~~is undertenable for a~~ cannot continue over a longer period, ~~being~~ uneconomic. Even in peace time, the quantities shipped out from the Ruhr were higher than the incoming quantities by approximately one-fifth. The disparity is at present even higher as regards

transport by water, because the ~~freight~~ quantities, ~~from~~ the Ruhr going upstream, are four or five times greater than those shipped to the Ruhr from the Upper Rhine. The long-planned ~~canalization~~ deepening of the Moselle, creating a really efficient connection between minette ore and Ruhr coal, would mean a big step forward in the utilization of minette ore in the Ruhr. It is impossible today to foresee how far France will go in the consideration of this idea.

As regards the future relations of Germany with Luxembourg, a very depressed mood prevailed on the Luxembourg ore market because of the low demand for the output and the mounting ~~scrap~~ stocks since the end of World War II. The German blast furnaces ~~do~~ not come into consideration as takers of large quantities until normal conditions are restored. Luxembourg itself and ~~especially~~ Belgium have turned more and more toward high-grade Swedish ore for blast furnace burdens because of lack of German coking coal, also to lower the prime cost of pig iron. The Saar is also not available as a buyer. It ~~sells~~ buys its ~~need~~ ore from the mines of Lorraine and Northern France. In order to resume the former ~~cordial~~ good relations with Germany, a contract for 400,000 tons of calcareous minette ore was signed for 1948. It is probable that relations once resumed will be further fostered and extended, provided that the ~~former~~ ratio between coke and minette ore purchases in the future ~~are~~ is made more favorable to Germany, as in the case of trade with Sweden and France.

4. The countries to the East and Southeast, the French and Spanish Colonies of North Africa.

Since World War II, the countries to the east and southeast,

Poland, Czechoslovakia, Hungary, Rumania, Bulgaria, and Yugoslavia, are only iron ore consumer countries and no longer ~~are~~ suppliers. Before the last war Yugoslavia and Hungary seemed to want to develop themselves as supplier countries for Germany, but because of the ensuing political developments of the postwar period, relations with Yugoslavia have been destroyed, and the iron ore deposits of Hungary have become ~~a~~ spoils of war for an enlarged Rumania and Czechoslovakia. All the countries named are striving for independent production of pig iron and steel, and even with a minimum of metallurgical production they have not enough ore to supply themselves. The economic union of the mining economies of Poland and Czechoslovakia, supported by the Soviet Union, ~~having~~ with the purpose of creating ~~somewhere~~ a metallurgical industry of very great dimensions in ~~the Near East~~ Eastern Europe, ~~on the contrary,~~ stimulates the increase of imports and ~~a~~ strong competition on the iron ore markets of Europe. Greece, and perhaps later also Turkey, offer somewhat better prospects for export. In Greece the ores of the laterite-like deposits near Lokris and Karditza and the still unexplored deposits of the Aegean Islands come under consideration for export. Turkey could well become an exporting country ~~through~~ as well the newly discovered deposit near Camdagh, in the event the ore can successfully be dressed into a concentrate with high iron content ~~of high percentage~~. However, extensive opening up, sorting, and briquetting is necessary, although it increases the prime cost.

Switzerland plays a modest role as ~~a~~ supplying country ~~in the circle of~~ for European consumers. A few thousand tons of high-grade Gonzen ores and several tens of thousands of tons from the Frick Valley could be absorbed monthly by Germany.

This exhausts the ~~number of~~ European countries that can supply Germany. There remain the former supplying ~~countries~~ areas overseas, Algeria and Tunisia, Newfoundland and Sierra Leone, and finally also Brazil. The first two countries sent 1 million tons of high-grade phosphrus-poor ores to Germany in the years of prosperity. Any considerable ore purchase by Germany from the ~~old supplying~~ former suppliers mines ~~is~~ are hardly to be reckoned on for years to come, especially since the United States, primarily for its own purposes, has leased, for several generations, the ~~Quenza~~ mine ~~having~~ with the highest productive capacity, and France would prefer to ~~bring in~~ work North African ores ~~in order to double the size~~ for the [illegible] of its heavy industry, rather than use the ores of Normandy and Anjou, which have a considerably high content of silica and phosphorus. A small order ~~of~~ for 35,000 tons of North African ore, to be delivered before June 30, 1949 was put through for the Western Zone and this will also be continued in the new contract for the delivery of 800,000 tons of French ores (see under 3).

5. The British Colonies of Newfoundland and Sierra Leone

It seemed at first that Germany was going to find much competition on the ore market for the Wabana ores of Belle Isle in Newfoundland. The ores, even before World War I, were important competitors on the western market and remained so in spite of occasional overloading of blast furnaces with all kinds of foreign ores. Their chief advantage lies not so much in price as in the easy fusibility of the oölite in well ~~broken up~~ crushed ore and in the good quality ~~of the~~ of the component parts (Table 43). Today the English are showing greater interest in these ores than before the Second World War, because

they have adapted their iron works for Thomas pig iron. The United States, which owns much land in Newfoundland, has, on the other hand, contrary to expectation, shown little inclination up to the present to import considerable amounts of ore. Phosphorus content is not considered desirable in the present blast furnace charge in the northern States. The newly discovered Labrador ore on Dyke-Sawyer Lake will also injure the demand for Wabana ores. Newfoundland, therefore, will seek other customers, especially since it had already been planned before the outbreak of World War II to develop the installations, which have great possibilities of expansion, to double their present output. Besides filling England's large orders, the Wabana Company agreed to supply Germany with 100,000 tons in 1949 and is ready at any time to increase the amount as much as desired on payment of an adequate price.

As regards the supplies to be obtained from Sierra Leone, the future is not as dark for Germany as was assumed at first. Even though England will use this colony, the nearest and richest in ore, to help supply the mother country, the great costs of developing the large ore possessions and the means of transportation will compel the enterprise to work at full capacity in order to lower the prime costs. Because of its location, only Germany, besides England, can come into consideration as an important buyer, perhaps also Italy and Turkey for smaller quantities, so that Germany could be satisfied in full. That a contract for 100,000 tons already exists has been mentioned in Section II, B, 1 b.

6. Other Supplier Countries

Brazil, Labrador, Venezuela. Until now only small quantities of iron ore

quantities have been shipped to Germany from Brazil. In the first two decades of this century they amounted to hardly more than 10,000 tons annually. Only in the third decade did the export rise to 150,000 tons (Table 31). Germany's reappearance as buyer on the Brazilian ore market, even after the collapse, will not be viewed with disfavor. Beginnings can be already recognized in the 100,000-ton order for 1949. It is possible that the deliveries will be greatly increased after the completion of the Minas Gereas-Victoria railroad.

As it has been possible to work economically with Newfoundland ores in Germany and to overcome the long distance from the inner part of Brazil to the Ruhr, it can also be assumed that the ores of the recently discovered rich deposits of Labrador are capable of competing on the European market and that an ample quantity will be available for Europe after the demand of the northern States of the United States has been satisfied, especially as, according to recent information on the Labrador deposit, nearly half of the ores, despite of low phosphorus content, are no longer rated as Bessemer ore in the United States. (Iron content about 0.1 - 0.15 percent.)

Venezuela also steps into the line of large suppliers. The German metallurgical industry should not neglect this country with its great iron ore wealth.

7. Concluding Observations

As we look back once more on the discussions concerning German future supplies of iron ores, there seem at first to be difficulties in all supplying countries which will require a long

time to overcome. However, the export conditions in most of the supplying countries have caused them to be willing, with certain restrictions, to supply Germany with ores in the future, if Germany can make available the necessary funds or exchange values. Except for Greece, suppliers have reappeared on the German ore market and have begun again, sometimes after some hesitation, to deliver in accordance with the buying power and the limited production capacity of the German metallurgical plants. The ore market, totally disrupted after the collapse, is slowly beginning to revert to normal. The metallurgical plants will replace a part of the missing ores, until the foreign currency exchange becomes more liberal, scrap obtained from demolished cities and factory installations. In any case, this is considerably cheaper than to develop the emergency mines, which operate at a loss, during the economically most difficult period in the reconstruction of the battered Reich. This is not intended as approval of neglecting the mining and dressing of the poor iron ores; however, the time has not yet come for this. The dressing of poor iron ores remains important for Germany just as it will become necessary in many countries within a foreseeable future (France, United States, European and Asiatic Russia, Manchukuo, Norway, and many others).

It must be repeated once again that the sale of scrap to foreign countries will, at a later date, prove very detrimental for the economy of the iron industry and can be justified only if needed to get in exchange urgent necessities of life for the people. Taking the former average content of 46 percent Fe of the German blast furnace charge, 1 million tons of scrap would replace 2.2 million tons of the

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former usual blast furnace charge, or 3.5 to 4 million tons of emergency ores, if the scrap ~~quantity~~ can be ~~secured by means~~ of planned collecting, ~~sifting~~, and preparation.

The ~~production~~ and smelting of good ore and scrap is only one of the milestones on the long road of obstacles and difficulties. However, this first goal constitutes the basis for the solution of all other problems. Although the blast furnace ~~plants~~ can be considered in most cases as fully capable of production, the other ~~working up~~ installations ~~are~~ either limited ~~in~~ production, obsolete, damaged, or ~~torn out of the framework of the economy~~. The German steel demand cannot be satisfied over a long period with 11.1 million tons yearly, but the 12.5 million tons of fuel ~~assigned~~ is not sufficient for the necessary 15 million tons. The dismantling of the best plants also hinders the goal of raising steel production to a level where it can fully cover domestic consumption and export. It will be difficult for an impoverished Germany to eliminate ~~those wounds of the production process of~~ the metallurgical works, especially as the expenditures are not covered by ~~their proceeds~~. What is in store for German heavy industry, which constitutes ore of the main ~~reserves for the maintenance~~ of the nation, can be seen from ~~the~~ already described and from the following summarized ~~recapitulation~~ of the mobilization of the ~~whole~~ foreign iron industry: The United States has spent, since the end of the war, over 2 billion dollars for modernization of her metallurgical industry and intends to ~~expend~~ spend another billion by the end of 1950 ~~half of the above amount~~ for development of the plants. In England the blast furnaces have been rebuilt from the ground up or modernized in order to lower coke consumption and provide full utilization of the

plants. England hopes to have, at the beginning of the next decade, the most efficient heavy industry in Europe and to be able to cover the demand in full. With the Monnet plan, France has set a goal, to be reached by 1952, which should equal Germany's production capacity even after removal of the present limitation of 11.1 million tons. Great savings in coal, current, and wages, amounting from 20 to 75 percent, are estimated. The development in Belgium exceeds in its extent the total expansion and improvement of the metallurgical plants in all other countries of the world and will result, even though not before 1960, in taking the place next to the United States. The competition on the European market will become considerable after the reconstruction of the country and the development of its communication lines. With Soviet help and by cooperative effort a "Ruhr region" of the east is being built in Poland and Czechoslovakia; the coal basis for it already exists to a large extent, and it has at its disposal, besides the ores bought in foreign countries, the ores of the Krivoy Rog deposit. The countries of India and South Africa, rich in mineral resources, are developing and becoming independent of European iron ore imports. Mexico, Brazil, Argentina, and Chile are also endeavoring to become independent as regards iron production. Australia wishes to rid herself of all necessary imports.

In the midst of this struggle of nations for profitable production and participation in supplying the world stands impoverished, overpopulated Germany, with the production capacity of its plants limited by age, destruction, dismantling, and control regulations. The scientific talents of the Germans and the deft and diligent hands of the workers alone will not suffice to create the possibility of rising from the deeply

depressed state of the economy. Without extensive funds, without long-range credits, and without free world trade these capacities can bear no fruit. The destruction of this industry, which before the war provided the foreign currency needed to support the nation, seals the permanent improverishment and the cultural depression of the German people.

Examining the iron ore production of the European countries, (with the exception of the two world powers, Great Britain and the Soviet Union) in the last peace year, 1938, as to iron content, and comparing it with the consumption of Europe, one finds a nearly perfect balance between production and consumption: 29.7 million tons of iron were produced and 30.1 million tons were used. According to this, Europe should be self-sufficient in iron ores, and could, theoretically, cover the demand for 300 years with its certain and probable reserves for its own territory. It has, however, been repeatedly pointed out that the demand increases with every year, thus the life of Europe's certain and probable ores can be estimated at about two centuries. It would be a mistake for Europe to disassociate itself completely from the other countries as regards the utilization of ore, because Europe wishes to market its finished goods in other parts of the world and must accept return deliveries for them, and also because during the next few decades the foreign ores, on an average, will be only those with a high iron content, such as would increase the efficiency of the European blast furnaces and decrease the prime cost. Finally, the heavy industry of the next century will be grateful if, besides the poorer ores, a few good deposits for smelting remain on the continent. It is always advantageous for countries poor in ore to safeguard the limited reserves of high-grade ores in times of prosperity and to obtain substitutes from

abroad, if ~~this is~~ the latter are not more expensive and if ~~they are~~ they are reliable and of equal quality. Logically, the African continent would seem to be designated to supplement the European iron ore ~~need~~ supply; the great importance of the mineral ~~treasures~~ resources of North, Central, and South Africa has been shown in Chapters III and IV. However, there remains in this connection the important problem of a sufficient population and its alimentation, necessities which even today are giving rise to worries where larger industries are ~~condemned~~ being started, as for instance in Rhodesia.

Instead of developing in the direction of European cooperation, Europe, and also the countries overseas, as repeatedly noted, are moving in the opposite direction, towards an exaggerated autarky of the individual countries. It is understandable when a nation does not export raw materials suitable for subsequent ~~treatment~~ processing because it has the ~~possibility of~~ capacity for remunerative processing ~~in the~~ within its own country, ~~however~~. But every small state believes today that it has to build up its own heavy industry even though its coal basis and ore output are utterly insufficient, and in spite of the availability of pig iron ~~being available~~ in other countries in any amount and at low prices. The supplying countries also, rich in ore deposits but without coking coal, pursue to a very large extent their own economic ~~high-pressure~~ policies, throttle their exports, and make even the modest export quota dependent on special concessions in return. If these endeavors go much further, the countries will squander their production capacities.

TABLE 146

THE IRON ORE DEPOSITS OF POLAND

RESTRICTED

Consecutive Number (1)	Stratigraphic Horizon (2)	Location of Deposits (Mines) (3)	Nature of Deposits (4)
1	Paleozoic	Staszyce near Slupia-Nowa in the Polish Central Mountains (Lysa Gora)	A veined hematite-siderite deposit of ~~sidetronable~~ origin connected with a disturbance zone. After roasting, a rich concentrate is obtained (57 percent Fe).
2	Older Paleozoic Crystalline schists	~~Schmiedeberg~~ Kowary in the ~~Riesengebirge~~ Karkonosze Mountains (Table 161a)	Contact metamorphic diabase iron ore deposits altered from magnetite and younger sulphides.
3	Silurian schists and diabase	Willmannsdorf, Hermannsdorf, and Kolbnitz near ~~Jauer~~ Jawor (Table 161a)	Epigenetic, intrusive, and hydrothermal, veined iron glance and spathic iron ores; age of occurrence unknown.
4	Upper new red sandstone	North edge of the Lysa Gora (Polish Central Mountains) near Opoczno and Ostrowice	Several sedimentary, oölitic, and in part manganiferous brown iron ore deposits originating from chamosites.
5	Lower Keuper (Rhaetic Lias)	North edge of the Lysa Gora (Polish Central Mountains) near Starachowice	Sedimentary clay ironstone seams in clays, ~~forming~~ within the limits of the deeper phreatic water; a mixed form between segregation and descensional deposits.
6	Keuper	Sawercze near Bendzin	Sedimentary brown iron ores.

RESTRICTED

(1)	(2)	(3)	(4)
7	From the Garantiana garanti zone to the Macrocephalites macrocephalus zone, Parkinson layers	Krakow-Wielun range, with the center near Czestochowa, area between ~~Kreuzberg~~ Klucibork and Czestochowa	Sedimentary siderite seams 0.05 to 0.20 meters thick in sandy and clayey sediments, ~~forming~~ within the limits of the deeper phreatic water; a mixed form between segregation and descensional deposits.
8	Fusca layers of the Dogger	Krakow-Wielun range	Sedimentary sphaerosiderite nodules in an 0.2 to 0.5 meter thick layer of clay, ~~forming~~ within the limits of the deeper phreatic water; a mixed form between segregation and descensional deposits.
9	Dogger	Tomaszow near Radom	Sedimentary, superficially distributed deposits, in part brown iron ores (siderite-oolite).
10	Lower chalk	North slope of the Carpathian Mountains in ~~Teschen~~ Cieszyn, Bielitz and Wadowice areas (the so-called Beskid or Carpathian ores).	Sedimentary, later strongly tectonically disturbed, clay ironstone oolites in the Carpathian Flysch, a mixed form between segregation and descensional deposits, ~~forming~~ within the limits of the deeper phreatic water.
11	Tertiary, eocene, and oligocene, as well as newer tertiary	In several places in Poland, products of transformation from old deposits	Brown and argillaceous iron ore.
12	Quaternary	Western part of the Lodz Wojewodztwo ~~Voivodeship~~, northern part of the Warsaw ~~Voivodeship~~ Wojewodztwo, northwestern part of the former Prussian province of Poznan ~~Posen~~, and area around Wilno	Segregation deposits in terrestrial waters, bog iron ores of chemical-biochemical sedimentary origin.
13	Unknown	[Samborowe?] Sambor, north of the Carpatian range	Reportedly, 40 to 60 percent Fe, 200 square kilometers ~~surface-covered~~ located ~~under the cover~~ at surface. More precise data are not yet available.

TABLE 147

COMPOSITION OF THE POLISH IRON ORE DEPOSITS
(in percent)

a. Czestochowa-Olkusz Argillaceous Iron Ore

Mines	Fe	Mn	P	SiO_2	Al_2O_3	CaO	MgO	S	Loss on ~~ignition~~ heating
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Andreas	28.40	0.25	0.27	13.20	3.86	6.15	4.71	0.069	
Kristine	36.30	0.56	0.032	12.00	5.87	1.30	0.92	0.44	
Peter	35.00	0.8	0.2	9.2	8.3	2.0	1.2	0.5	
Zarki	36.6	0.6	0.2	7.9	4.8	5.6	3.8	0.5	
Maria	32.0	0.6	0.2	23.5	6.9	2.8	2.6	0.8	
Erzoska	35.8	0.6	0.1	10.4	6.3	2.0	1.8	0.7	
Ludwig	37.7	0.6	0.3	11.4	6.2	1.9	2.4	0.1	
Wladisir-Elisabeth	29.1	0.6	0.1	20.7	14.8	0.5	0.6	0.6	H_2O
Valentin	34.0	0.6	0.2	10.2	7.2	3.2	2.1	0.4	25 - 29
Paul ~~Mine~~	32.0	0.6	0.1	15.0	7.5	2.3	2.3	0.9	
Georg	35.6	0.6	0.4	7.4	5.0	2.5	2.7	0.2	CO_2
Alexander	30.5	0.6	0.1	18.3	8.5	2.3	2.1	0.8	
Huta Nowa III	30.7	0.6	0.3	9.5	7.9	6.2	4.0	0.4	0.2 - 4
Huta Stara II	32.3	0.6	0.1	11.5	7.0	3.6	3.4	0.4	
Poczesna I	32.6	0.8	trace	10.5	7.7	3.8	4.0	0.3 - 0.5	

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Adalbert	30.0	0.5	0.1	13.0	7.6	8.7	4.7	0.3	
Johann	31.33	0.32	--	6.17	--	6.90	5.76	0.89	
Alina	48.0	0.13	0.13	5.47	--	0.33	0.13	0.18	
Joseph	48.0	0.13	0.016	5.47	--	0.53	0.13	0.186	
Janina	35.0	3.0	--	--	--	--	--	--	

b. Ores in the Radom District

Occurrence	Type of ore ~~of bleaching~~	Fe	Mn	P	SiO_2	Al_2O_3	CaO	MgO	S	Loss on ~~ignition~~ Heating
Radom Staragora	Argillaceous iron ore	32.4	0.74	0.08	14.0	10.4	2.0	1.03	--	25
Helena near Chlewiska	Brown iron ore, secondary with argillaceous iron ore	32-37	0.95	0.1	20-25	13-15	--	0.15-0.2	0.02	4 - 6
Tychowo	Dogger brown iron ore connected with argillaceous iron ore	38	0.2	0.01	30	--	--	--	--	--
	Bog-iron ore	18-39	1-3	0.3-5.2	--	--	--	--	--	--

TABLE 147 -- Continued **RESTRICTED**

c. Other Ores in the Former German Area

Occurence (1)	Type of Ore (2)	Fe (3)	Mn (4)	P (5)	SiO_2 (6)	Al_2O_3 (7)	CaO (8)	MgO (9)	S (10)	Heating Loss on (11)
Klucz3bork (1)	Brown iron ore,									
	dressed	37.12	0.55	0.51	5.80	2.87	3.44	2.46	0.11	29.30
	roasted	48.00	--	--	--	--	--	--	--	--
Tarnowi	brown iron ore	27.14	2.94	0.17	46.20	--	--	--	--	--
Tarnowi		32.93	--	--	24.32	23.61	0.48	1.70	--	--
Tarnowi		29.41	7.38	--	30.30	--	--	--	--	--
Tarnowi		33.99	2.42	0.120	22.02	9.85	1.01	0.72	0.07	11.64
Bytom	Argillaceous iron ore	10-20	trace	--	very large		--	--	--	--
Beskid ores										
Carpathian foothills	Bog iron ore	35.60	1.74	0.37	25.70	2.47	- - -2.45- -		--	15.70
Kowary	Fine ore	34.02	0.25	0.04	21.20	5.02	4.53	6.15	1.05	--
Schmiedeberg	Lump ore	39.66	0.12	0.026	18.41	3.72	4.20	5.88	1.08	--
Hermannsdorf		44.02	2.80	0.050	22.00	2.20	0.70	1.00	0.40	4.20

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Willmannsdorf		50.76	0.99	0.141	13.60	6.50	3.51	3.62	1.20	0.90
Johannesberg	Roasted	44.60	0.60	0.020	20.00	2.70	6.00	6.10	0.41	0.25
By Tom ~~Beuthen~~	Brown iron ore	28.65	3.75	0.099	26.80	--	--	--	0.04	35.45
Olesno ~~Rosenberg~~		20.31	0.40	0.100	49.60	0.36	3.14	1.22	0.08	15.60
Kostellitz mine	Ferruginous sandstone	22.12	0.11	0.140	61.35	2.02	0.36	0.06	0.04	4.44
Kostellitz mine	Dressed	40-50	--	--	20.25	--	--	--	--	--

(1) 0.47 percent Pb, 1.94 percent Zn

TABLE 148

IRON ORE RESERVES OF POLAND

(in 1000 tons)

District	Proved and Probable Reserves Fe		Possible Reserves Fe	
Czestochowa	15,000	4,800	15,000	4,800
Radom district	2,500	800	2,500	800
Olkusz district	100	30	150	45
Tomaszow district	--	--	--	--
Galicia and the other western Beskid, Carpathian, and bog-iron ores	--	--	129,500	30,000
Former German territory	10,000	3,500	30,000	10,000
	27,600	9,130	177,150	45,645

TABLE 149

IRON ORE PRODUCTION AND IMPORTS, AND PIG IRON PRODUCTION OF POLAND

(in 1000 tons)

Year	Iron ore	Pig iron
1913	329	418
1920	119	43
1921	240	61
1922	395	480
1923	454	517
1924	292	333
1925	214 ~~241~~	315
1926	319	327
1927	546	618
1928	737	684
1929	660	706
1930	477	478
1931	294	317
1932	77	199
1933	161	306
1934	247	382
1935	332	394
1936	469 ~~468~~	584
1937	776	724
1938	964	966
1939	922	268
1940	--	915
1941	--	1081
1942	--	1127
1943	--	1169
1944	--	1084
1945	94	228
1946	424	738
1947	544	869
1948	700	1100
1949	875 (1)	1200

(1) Of this production, 70 percent was produced in ~~allocated to~~ Eastern Upper Silesia.

TABLE 149--Continued

Ore Production of the Most Important Ore Regions of Poland in 1936 and 1937

Region	1936	1937	1938	1939	1946
Czestochowa	379,259	642,645	--	--	--
Radom	61,338	111,254	--	--	--
Dabrowa ~~Dombrowa~~	21,115	14,983	--	--	--
Tarnowice		3,400	--	--	--
Total:	461,712	772,282	964,200	922,000	424,000

Ore Imports into Poland in Tons

From (1)	1934 (2)	1935 (3)	1936 (4)	1937 (5)	1938 (6)	1946 (7)	1947 (8)
Sweden	41,850	111,420	413,000	651,000	665,000	591,000	1,024,000
West Africa	--	28,260	--	--	--	--	--
USSR ~~Russia~~	46,120	25,660	--	--	--	--	--
Norway	16,130	25,480	--	--	--	--	--
Spanish Morocco	12,530	24,150	--	--	--	--	--
Greece	7,550	20,320	--	--	--	--	--
Spain	--	18,150	--			--	--

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Czechoslovakia	--	10,600	--	--	--	--	--
Portugal	--	9,580	--	--	--	--	--
French Morocco	--	9,530	--	--	--	--	--
Germany	--	4,460	--	--	--	--	--
Not Specified	12,670	16,670	--	--	--	--	--
	136,850	304,280	413,000	651,000	665,000	591,000	1,024,000

TABLE 150

COMPOSITION OF THE BULGARIAN IRON ORES
(in percent)

Deposits	Kind of Ore	Fe	Mn	P	SiO_2	Al_2O_3	CaO	MgO	S	Miscellaneous Minerals	Loss on Heating
Blagovest	Magnetite	63.00	trace	0.0	0.8	--	--	--	--	-- --	--
Krepost		50.20	0.42	0.4	19.32	--	--	--	1.06	-- --	--
(Khaskovo)		49.62	0.29	0.1	14.25	--	--	--	1.54	-- --	--
		66.46	0.33	0.05	2.47	--	--	--	--	-- --	--
Chiprovtsi	Magnetite, siderite	45-50	--	--	4.22	--	--	--	2.5	As 1.5 - 4	--
	Limonite	20 - 50	--	--	1-13	--	--	--	0.5	As trace	--
Troyan	Hematite[1]	44.64	0.05	0.8	11.56	3.52	9.96	1.13	0.04	TiO_2 0.18	0.80
Ketsizov [Demandatierd]		47.35	0.18	0.15	22.30	3.80	1.80	0.67	0.10	Cu 0.43	1.74
(Zvezdits)		49.40	0.23	--	29.19	0.18	0.10	trace	--	TiO_2 0.17	--
Bugas	Magnetite sands	58.50	0.07	0.02	2.54	5.50	0.92	2.20	0.034	TiO_2 5.20 Cu 0.025	--

[1] V_2O_3 = 0.10; CO_2 = 7.92; Cr_2O_3 = 0.0 percent.

TABLE 151

IRON ORE DEPOSITS CEDED BY HUNGARY TO RUMANIA

Moutain Range	Kind of Ore	Proved and Probable Reserves Fe		Possible Reserves Fe		Total Reserves Fe	
East Carpathians	Brown and argillaceous iron ore in ~~Szeklerland~~ Transylvania; siderite.	68	27	960	288	1,028	315
Bihar and ~~Siebenbürgen ore Mountains~~ Transylvania	Red and spathic iron ore, magnetite, brown iron ore	534	214	2,897	1,159	3,431	1,373
Poiana-Ruscă	Gyalar, Hunyad brown iron ore, spar, manganese	3,655	1,462	13,335	5,334	16,990	6,796
Banat	Magnetite, Vaskö and Dognaczka	1,843	1,106	5,227	3,166	7,120	4,272
Carpatho-Ukraine - Dolha (unidentified)	Brown iron ore	unimportant					
Total Reserves:		6,100	2,809	22,469	9,947	28,569	12,756

TABLE 152

ANALYSIS OF THE IRON ORES OF THE RUMANIAN DEPOSITS (in percent)

(Names of mines may have been changed since the land cession)

Mines (1)	Fe (2)	Mn (3)	P (4)	SiO_2 (5)	Al_2O_3 (6)	CaO (7)	MgO (8)	S (9)	Cu (10)	Loss on Heating (11)
East Carpathians										
Dolha (unidentified)	--	--	--	--	--	--	--	--	--	--
Bihar-Transylvanian ore mountains										
Brown ore, spar	40.00	--	--	--	--	--	--	--	--	--
Magnetite	50.00	0.35 1.23	0.07 0.14	---	--	--	--	0.05 0.20	--	--
Poiana-Ruscai Mountains										
East wing of the range										
Zalaacul mine, limonite	38.12	1.89	0.12	12.66	4.46	6.76	2.12	0.36	0.15	13.07
	47.65	3.95	0.02	14.55	--	7.45	2.88	--	--	--
	44.23	1.92	0.06	12.93	--	2.71	0.65	0.03	--	--
Siderite	37.82	1.45	0.06	18.45	1.25	31.55	10.61	--	--	--
	27.89	1.63	--	33.54	--	14.86	9.45	--	--	--
	34.60	1.51	0.04	18.91	0.44	9.80	4.10	--	--	--
Ankerite	7.06	0.58	--	12.29	0.69	27.19	12.38	0.04	--	--
	--	--	--	3.53 Unleached zone	0.55	29.71	20.25	--	--	--

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Red iron ore	42.89	2.05	0.01	25.10	0.55	0.26	0.28	0.04	--	8.10
Varoserdo, limonite	45.90	3.53	--	14.53	0.11	8.80	2.26	--	--	--
	44.64	2.83	--	13.58	3.32	6.01	2.56	--	--	--
Dolinka near Vascau										
Red iron ore	62.81	0.07	0.42	6.10	1.04	1.40	1.54	--	0.07	--
Ploesca, limonite	77.39	3.86	0.05	5.95	3.31	3.83	0.60	--	--	--
	68.70	3.86	0.06	10.41	1.32	5.12	3.09	—	—	—
Central and Southern part of the range										
Ghelar, brown iron ore	47.95	0.08	0.04	19.90	4.33	0.49	0.32	trace	0.04	5.38
Spar	37.82	1.99	--	9.32	0.72	0.53	3.49	--	--	34.32
Gruniuy, brown iron ore	52.32	0.06	0.19	9.27	4.04	0.22	0.24	0.03	5.15	10.75
Spar	30.88	2.40	0.11	22.67	0.45	0.82	4.06	3.13	0.06	25.23
	29.86	0.06	0.15	22.20	1.69	1.80	3.95	4.02	0.08	24.13
(unidentified)										
Aulun, brown iron ore	69.73	--	--	1.00	0.20	--	--	--	--	--
Sztirminoza (unidentified)										
Magnetite	61.00	0.06	0.18	7.62	3.76	1.70	2.32	--	0.06	--
	62.00	0.06	0.05	6.42	3.65	0.43	2.05	—	0.04	—
Ocna-de-Fier										
Vinto (Moravita)										
a. Wash ore	45.29	--	--	18.00	--	--	--	--	--	--
b. Magnetic iron ore										
Paulus mine	65.79	0.17	--	6.65	0.34	1.10	--	--	--	--

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Eleonore mine	65.54	0.27	0.07	6.65	0.24	2.47	0.03	--	--	--
Karoly mine	57.58	0.29	0.17	11.48	1.69	2.96	1.80	--	0.20	--
Delius mine	55.48	--	0.02	11.88	5.85	0.10	1.54	--	0.04	--
Reichenstein mine	55.00	0.73	0.09	13.25	1.43	2.89	2.93	0.15	0.02	--
c. Other ores										
Ferenez mine	39.30	2.42	0.06	26.07	3.32	4.99	3.37	0.06	0.01	--
Eleonora mine	40.08	1.15	0.16	19.35	2.35	11.90	2.77	0.04	--	--
Delius mine	45.72	1.26	0.07	17.80	7.23	9.30	--	0.21	--	--
Paulus mine	42.90	0.79	0.29	18.39	3.01	10.80	1.69	0.05	0.07	--
Dognecea ~~Dognetska~~										
Julia mine	37.25	0.90	0.13	29.94	2.19	16.30	0.93	0.13	0.05	--
Peter Paul mine	41.19	--	0.09	17.35	6.46	7.80	0.48	0.22	0.33	--
Istran mine	57.48	--	0.07	12.67	0.75	4.11	--	0.10	0.12	--
Tarnova										
Manganese iron ore	14.31	14.04	0.40	36.00	8.96	2.42	0.99	0.11	--	--

TABLE 153

RUMANIAN IRON ORE AND PIG IRON PRODUCTION
(in 1000 tons)

Year	Iron Ore	Pig Iron	Year	Iron Ore	Pig Iron	Year	Iron Ore	Pig Iron
1913	325	69	1929	90	72	1939	132(1)	119
1920	74	19	1930	63	69	1940	150	100
1921	91	33	1931	62	43	1941	166	100
1922	95	32	1932	8	9	1942	215	155
1923	99	39	1933	14	1	1943	244	171
1924	103	46	1934	84	57	1944	243	141
1925	107	64	1935	94	82	1945	141	54
1926	103	63	1936	108	97	1946	112	66
1927	97	64	1937	129	136	1947	121	90
1928	84	70	1938	133	130			

(1) Including 30,000 to 40,000 tons of magnetic iron ore from Ocna de Fer and 100,000 tons of spathic iron ore from the Hunedoara (Eisenmarkt) region.

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THE IRON ORE DEPOSITS OF GERMANY

CONSECUTIVE NUMBER	STRATIGRAPHIC HORIZON	LOCATION OF DEPOSITS (MINES)	NATURE OF DEPOSITS PERIOD OF FORMATION OF THE ORES
1	a. Lowest Arenig of the lower Silurian near Steinach, Augustenthal; b. Arenig and Skiddavian of lower Silurian near Unter- and Oberwirbach; c. Lower Llandeilo of the lower Silurian near Wittmannsgereuth; d. Upper Caradoc of the lower Silurian near Schmiedefeld (Kreis Saalfeld)	Schwarzburg anticline with Augustenthal, Steinach, Schmiedefeld in Kreis Saalfeld, Eisenberg near Unterwirbach, and Lerchenhuegel near Oberwirbach. Frankenwald asymmetrical anticline, east Thuringian main anticline, and Hirschberg-Gefell anticline.	Segregation deposits of marine origin: sedimentary, lower Silurian deposits of iron silicate ores (chamosites and thuringites) and less frequently of red iron ore.
2	Lower Devonian (Gedinnian to Koblenzian layers inclusive)	Siegerland-Wied siderite region (also Eifel)	Intrusive-hydrothermal and remotely magmatically formed veins of siderite and some copper pyrites, the ores having formed in the upper Koblenzian and middle Devonian period.
3	Boundary between Silurian schists and grey wacke	Neudorf near Pfaffenberg, Harz Mountains.	
4.	Lower Devonian	Specular iron ore vein districts of Muesen-Weidenau, Schutzbach-Steinbach, Rossbach, Bendorf, Treis-Alf, Veldenz and Saarburg-Kell, with the Luise Mine near Panzhaus not far from Saarburg in the Rhenish schist range.	Epigenetic
5	Middle Devonian to lower Carboniferous	Lahn-Dill lowland, Sauerland, Kellerwald, upper and central Harz Mountains, Fichtelgebirge	Genesis debated. Either: Syngenetic diabase iron ore layers with a preponderance of red iron ore, more rarely with siderite and magnetite, resulting

4.	Lower Devonian	Specular iron ore vein districts of Muesen-Weidenau, Schutzbach-Steinbach, Rossbach, Bendorf, Treis-Alf, Veldenz and Saarburg-Kell, with the Luise Mine near Panzhaus not far from Saarburg in the Rhenish schist range.	Epigenetic
5	Middle Devonian to lower Carboniferous a. Lower Carboniferous, b. Middle upper Devonian, c. Lower upper Devonian, d. Upper middle Devonian	Lahn-Dill lowland, Sauerland, Kellerwald, upper and central Harz Mountains, Fichtelgebirge and Vogtland; also red iron ore from the Eifel mine on the boundary between middle and lower Devonian.	Genesis debated. Either: Syngenetic diabase iron ore layers with a preponderance of red iron ore, more rarely with siderite and magnetite, resulting from ferriferous submarine exhalations and sources; or, according to Lehmann: Epigenetic, intercrustal-hydrothermal formations within bedded sediments.
6.	Contact metamorphic Devonian rock in hornblendic and salite schists, knotenschiefer, and marble.	Berggiesshuebel in the Elbtal schist range.	Diabase iron ore layers metamorphosed through contact with granite in the beginning of the Rotliegendes-Zechstein period, primarily magnetite with copper, tin, lead, and zinc ores as secondary ores.
7	Upper middle Devonian	David Mine near Warstein in Westphalia.	Junction between syngenetic, Devonian diabase iron ore layers and epigenetic, tertiary weathered continental deposits (see No 5 and 8)
8	Massive limestones of the upper middle Devonian and lower upper Devonian and their weathered remains	Lahn region, Taunus and Hunsrueck with the Giessen brown iron ore mines, the Dr. Geier Mining Company (Bingerbrueck and Stromberg) Wuergengel near Braunfels, Oberrossbach, Eifel, and the Berg limestone region.	Epigenetic, tertiary weathered continental deposits of manganiferous brown iron ore and ferromanganese ore.
9	Lean coal seams (Namur) and forge coal seams of the upper Carboniferous	Friederika near Bochum, Gottessegen, Ludwig Mine in Rellinghausen, Wilhelmine Victoria Mine in the lower Rhenish-Westphalian black coal region.	Sedimentary deposits of the "Hatting siderite vein" and various "blackband ironstone veins", constituting a mixed form between segregation and descensional deposits within the limits of the deeper phreatic water.
10	Zechstein limestone	Hueggel near Osnabrueck and Friedrich Wilhelm on the Schafberg near Ibbenbueren.	Epigenetic, hydrometasomatic siderite layers and pockets, in many cases subsequently altered into brown iron ore; period of mineralization unknown.
11	Lower, middle and upper	North and south edge of the [illegible] Forest and the	Hydrometasomatic replacement bodies and deposits of siderite of recent

9	Lean coal seams (Namur) and forge coal seams of the upper Carboniferous	Friederika near Bochum, Gottessegen, Ludwig Mine in Rellinghausen, Wilhelmina Victoria Mine in the lower Rhenish-Westphalian black coal region.	Sedimentary deposits of the "matting siderite vein" and various "blackband ironstone veins", constituting a mixed form between segregation and descensional deposits within the limits of the deeper phreatic water.
10	Zechstein limestone	Hueggel near Osnabrueck and Friedrich Wilhelm on the Schafberg near Ibbenbueren.	Epigenetic, hydrometasomatic siderite layers and pockets, in many cases subsequently altered into brown iron ore; period of mineralization unknown.
11	Lower, middle and upper Zechstein	North and south edge of the Thuringian Forest and the Spessart, with Gross-Kamsdorf, Arminius, Klinge, Mommel, Stahlberg, and the Bieber mines.	Hydrometasomatic replacement bodies and deposits of siderite of recent tertiary mineralization, for the most part subsequently altered into brown iron ore.
12	Various stages of the Muschelkalk	Mardorf near Homberg in Lower Hessen.	Junction between metathetic "bottom ore" siderite originating from shell lime (Muschelkalk) and sedimentary bean ore deposits resulting from the weathering of middle Eocene bean ore limestone.
13	Jura: a. Lower Lias (Arieten layers)	Nothern Germany: Friedrike near Harzburg (see also under 14), Sommerschenburg, Scheppau.	
14	b. Middle Lias (Jameson layers)	Northern Germany: Friedrike near Harzburg, Fallstein, Asse, Elm, Altenbeken, Bonenburg, Velda-Volkmarsen, Echte near Seesen, Markoldendorf near Einbeck and Bislich near Wesel, Rottorf on the Klei, Marie Caroline near Lenglern and Steinberg (Goettingen).	Syngenetic brown and red iron ore deposits of partially oolitic and partially fine-clastic structure, constituting marine segregation deposits. Phosphoric iron ore embedded in calcareous-sandy binding material. Pea-sized to pinhead-sized oolites.
15	c. Ferruginous sandstones of the Dogger (Murchison horizon)	Southern Germany: Hohenstadt-Altfalter-Vorra, Erwin II near Pegnitz-Troschenreuth, Vierzehnheiligen near Lichtenfels, Staffelstein, Wilhelm near Wasseralfingen, Aalen, Karl near Geislingen, Roethelberg near Herbolzheim, and Schoenberg near Freiburg (see also under 16).	
16	d. Humphries layers of the Dogger	Lupfen near Tuttlingen, Gutmadingen (see also under 20), Kandern, and Freiburg-im-Breisgau.	
17	e. Macrocephalus layer	Karl-Egon near Gutmadingen, Zoll-	

		heim, and Schoenberg near Freiburg (see also under 16).	
16	d. Humphries layers of the Dogger	Lupfen near Tuttlingen, Gutmadingen (see also under 20), Kandern, and Freiburg-im-Breisgau.	
17.	e. Macrocephalus layer of the upper Dogger	Karl-Egon near Gutmadingen, Zollhaus-Blumberg, Porta-Westfalica with Porta I near Haeverstadt, Luebbecke.	
18	f. Upper lower Oxfordian of the Malm	Hansa near Harlingerode	Same as above, but with a pure calcareous binding material.
19	g. Lower and middle upper Oxfordian of the Malm with the Nammen rocky seam, the Victoria seam, and the Wohlverwahrt seam.	Nammen and Wohlverwahrt near Kleinen-Bremen in the Weser range, in the area surrounding Braunschweig near Isenbuettel, Hillerse, Gifhorn (Vechelde), and Wendezelle	Syngenetic brown and red iron ore deposits of partially oolitic and partially fine-clastic structure, constituting marine segregation deposits.
	to the Barremian) of the lower chalk.	deposits near Lutter, on the Fallstein, near Harzburg, on the Harliberg, on the Quedlinburg syncline, on the Asse, on the Elm, near Hedwigsburg, in the Hils basin, in the Osterwald, near Hildesheim, Altenbeken, and Brackwede.	essentially a brown iron ore deposit consisting of detrital iron ore deposits, with part of a marine segregation in the Salzgitter hill range, characterized by several oolitic ironstones.
21	Barremian and Aptian of the lower chalk.	Bentheim, Ochtrup, and Ottenstein.	Sedimentary spaerosiderite nodules and beds in marine, fatty clays, constituting a mixed form between segregation and descensional deposits within the limits of the deeper phreatic water.
22.	Pre-Cenomanian chalk	Fraenkische Alb: Barbara Mine on the Erzberg and the Karl Mine near Amberg; Karoline, Etzmannsberg and Fromm near Sulzbach-Rosenberg; Maffei Mine near Auerbach, Arzberg near Arzberg, Langenhoeh near Schnabelwald, and Johanna near Hiltersdorf.	**Metasomatic** iron spar descensionally formed from Malm limestone through replacement, transformed into brown iron ore through subsequent weathering. There seems to be no question here of an ascensional-hydrothermal origin of the ores. (Transgressional conglomerates from the lower Cenomanian on the Jura near Sulzbach-Rosenberg. The ore originated from the Jura of the Hahnbeck syncline).
23	Upper Emschian	Ilsede horizon with Buelten-Adenstedt and near Stederdorf. Also near Rolfsbuettel, Beddingen valley, on the Butterberg near Harzburg, Zilly and Halberstadt, Emmerke not far from Hildesheim, and the Gehrden	A syngenetic brown iron ore deposit formed through a mechanical process, representing an emersion roof, with part of a marine segregation characterized by a few oolitic ironstones.

22.	Pre-Cenomanian chalk	Fraenkische Alb: Barbara Mine on the Erzberg and the Karl Mine near Amberg; Karoline, Etzmannsberg and Fromm near Sulzbach-Rosenberg; Maffei Mine near Auerbach, Arzberg near Arzberg, Langenhoeh near Schnabelwald, and Johanna near Hiltersdorf.	Metasomatic iron spar descensionally formed from Malm limestone through replacement, transformed into brown iron ore through subsequent weathering. There seems to be no question here of an ascensional-hydrothermal origin of the ores. (Transgressional conglomerates from the lower Cenomanian on the Jura near Sulzbach-Rosenberg. The ore originated from the Jura of the Hahnbeck syncline).
23	Upper Emschian	Ilsede horizon with Buelten-Adenstedt and near Stederdorf. Also near Rolfsbuettel, Beddingen valley, on the Butterberg near Harzburg, Zilly and Halberstadt, Emmerke not far from Hildesheim, and the Gehrden mountain near Hanover.	A syngenetic brown iron ore deposit formed through a mechanical process, representing an emersion roof, with part of a marine segregation characterized by a few oolitic ironstones.
24.	Upper Senonian (lower Mucronatian Senonian)	Damme in the southern part of Oldenburg.	A basaltic iron ore deposit representing a transgressional conglomerate.
25.	Tortonic and Sarmatic basalts of the upper Miocene.	Vogelsberg	Epigenetic basaltic iron ore deposits of the lower Pliocene period representing continental weathered deposits
26.	Diluvium	Schandelah, Hameln Forest near Lehrte, Biendorf, and Coesfeld.	Detrital iron deposits of brown iron ore carried and washed out by continental ice.

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TABLE 161a

GERMAN DEPOSITS IN THE AREAS OCCUPIED BY POLAND

(For composition of the ores see Table 147)

Consecutive Number (1)	Stratigraphic Horizon (2)	Location of Deposits (Mines) (3)	Nature of Deposits Period of Formation of the Ores (4)
1	Silurian schists and diabases	Willmannsdorf, Hermannsdorf and Kolbnitz near Jauer in the Bober-Katzbach range, Silesia.	Epigenetic, intrusive-hydrothermal veins of specular and spathic iron ore of unknown age, occasionally carrying galena and zinc blende.
2	Lower Paleozoic crystalline schists	Schmiedeberg in the Riesengebirge.	Regional and contact-metamorphic, sedimentary diabase iron ore deposits of magnetite and more recent sulfides between amphibolite schists in the hanging wall and crystalline limestone in the basal portion, altered during the Caledonian and Varistic periods of mountain formation.
3	Lower Paleozoic	Johannesberg near Landeck, Glatz mountains region.	Regional and contact-metamorphic, sedimentary diabase iron ore deposits of specular iron ore and magnetite with accompanying skarn ores and crystalline limestone, altered during the Caledonian and Varistic periods of mountain formation.

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(1)	(2)	(3)	(4) RESTRICTED
4	Paleozoic	Bad Reinerz in the Glatz mountains region.	Intrusive-hydrothermal red iron ore veins presumably formed in connection with Varistic intrusions, which are connected with dolomitic horizons in micaceous schists.
5	Lower Muschelkalk	Beuthen, Beuthen-Stadtwald, and Tarnowitz in Upper Silesia, as well as Olkusz in Poland.	Gossan brown iron ores connected with hydrometasomatically formed lead-zinc ore deposits of tertiary mineralization.
6	Wilmsdorf layers of the lower Rhaetic	The experimentally operated Hegersfelde mine, Kreis Guttentag, Upper Silesia.	Sedimentary spathic iron ore nodules in sand and clay, a mixed form between segregation and descensional deposits, [redacted] within the limits of the deeper phreatic water.
7	Hellwald Estherian layers of the middle Rhaetic	The experimentally operated mines near Forstfelde and Hegenau in the area around Kreuzburg and Rosenberg in Upper Silesia.	Thin sedimentary spathic iron ore veins in sandstones and loams, a mixed form between segregation and descensional deposits, [redacted] within the limits of the deeper phreatic water
8	Ferruginous sandstone of the lower Dogger	Grunsruh and Kostellitz near Landsberg in Upper Silesia.	Epigenetic weathered deposts on the continent.

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(1)	(2)	(3)	(4)
9	Parkinsonian layers of the Dogger	Birkenhorst and Ammern east of Rosenberg, Upper Silesia.	Thin sedimentary spathic iron ore veins in sandy and clayey sediments, a mixed form between segregation and descensional deposits, ~~forming~~ within the limits of the deeper phreatic water.
10	Tertiary	West of Gleiwitz to Ratibor.	Sedimentary clay ironstone deposits in sandy and clayey layers, a mixed form between segregation and descensional deposits, ~~forming~~ within the limits of the deeper phreatic water.

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TABLE 162

ANALYSIS OF THE GERMAN IRON ORE DEPOSITS, ARRANGED BY MINING DISTRICTS

(in percent)

Region or Mine (1)	Fe (2)	Mn (3)	P (4)	SiO_2 (5)	Al_2O_3 (6)	CaO (7)	MgO (8)	S (9)	V (10)	TiO_2 (11)	CO_2 (12)	Water of Crystallization ~~Sulphur~~ Water (13)	Alkalies (14)	Residue (15)	Moisture ~~Humidity~~ (16)
1. Siegerland Siderite Region															
Crude spar	31.30	6.50	0.008	15.20	0.75	0.60	1.90	0.28	0.00	Trace	31.00	0.50	0.25	16.10	0.50
Crude spar	34.50	7.10	0.006	0.40	0.70	0.70	2.60	1.85	0.00	Trace	34.30	0.40	0.20	7.10	0.00
Fine spar, crude	29.00	5.80	0.008	18.30	2.20	0.85	2.60	0.78	0.00	trace	--	5.00	--	20.20	--
washed	32.40	6.03	0.005	10.80	1.23	0.93	2.55	0.31	0.00	trace	--	1.80	--	10.19	--
Flotation spar	32.50	6.50	--	12.50	--	--	--	--	0.00	trace	--	--	--	--	17.50
Roasted spar I	49.60	10.75	0.008	9.20	0.40	1.10	4.80	0.26	trace	trace	0.20	0.40	0.30	9.80	3.60
II	43.00	7.50	0.010	19.00	1.40	0.50	2.50	1.00	0.00	trace	--	5.00	--	20.00	2.00
Specular iron ore	59.00	1.50	0.010	7.00	0.50	0.15	0.25	0.01	0.00	trace	8.50		--	8.00	1.00
Red mud	49.00	2.50	0.010	11.00	1.80	0.80	1.90	0.01	0.00	trace	8.70		--	15.00	17.50
2. Westerwald Sparry and Brown Iron Ore Region															
Eiskeller, spathic ore	31.65	6.52	0.020	12.93	--	--	--	--	--	--	--	1.39	--	--	--
brown iron ore	39.42	3.51	0.180	23.93	2.99	0.20	2.0 0.44	0.43	--	--	--	--	--	--	7.64
Glückauf, brown iron ore	40.00	0.90	0.40	22.00	3.00	0.34	1.60	0.04	--	--	--	10. 1.50	--	24.00	11.00

3. Red, Brown, and Alluvial [= Flußeisenstein] Iron Ore Deposits of the Lahn and Dill Area and Upper Hessen

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Lahn Area

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Aggregate burden	36.05	1.65	0.400	23.40	4.80	5.05	1.00	0.25	0.00	0.40	5.20	5.20	0.85	24.40	10.30
Red iron ore I	46.67	0.11	0.590	24.10	2.92	1.77	0.60	0.23	0.00	0.32	0.70	2.27	0.22	25.15	2.60
II	40.20	0.40	0.250	21.90	3.93	5.01	1.23	0.19	0.00	0.31	7.60	2.20	0.30	23.10	3.60
Alluvial [illegible] ore	30.10	0.16	0.170	11.40	2.90	22.70	0.85	0.03	0.00	0.20	16.00	1.65	0.52	12.10	6.00
Brown iron ore	34.50	5.85	0.520	17.90	7.10	1.45	1.30	0.12	0.00	0.50	1.25	9.90	1.90	19.20	20.70
Dill Area															
Red iron ore I	47.40	0.16	0.280	19.95	3.40	3.40	1.10	0.12	0.00	0.38	0.45	2.00	0.30	20.70	2.70
II	36.55	0.16	0.140	23.25	4.10	8.70	1.60	0.02	trace	0.55	7.35	1.60	0.95	23.95	1.40
II	35.95	0.170	0.190	26.40	2.80	7.90	1.50	0.42	0.0	0.33	8.30	1.60	0.25	26.40	1.90
Alluvial [illegible] ore	34.57	0.16	0.150	11.83	2.50	19.09	--	--	--	--	--	3.85	--	13.60	--

4. Vogelsberg Basaltic Iron Ore, Wetterau Manganiferous Brown Iron Ores

Brown iron ore, washed	46.00	0.40	0.370	10.00	10.70	0.57	0.45	-	--	--	--	--	--	--	11.00
washed	41.50	0.32	0.330	12.60	10.65	0.60	0.36	0.04	0.03	1.20	0.50	12.80	0.40	17.0	11.60
washed	38.68	0.52	0.280	8.46	3.20	0.22	0.19	0.02	--	1.50	--	--	--	10.50	12.09
crude ore	17-26	<0.38<	0.220	24.00	--	--	--	--	--	--	--	--	--	--	27.00
Giessen brown ore mines	19.00	13.64	0.045	20.50	18.30	0.25	0.65	0.02	--	0.40	0.60	9.00	1.75	32.90	25.80
Rossbach	46.80	0.50	0.770	10.13	11.94	0.20	--	2.00	--	--	--	--	--	--	--
	43.00	4.35	0.380	13.50	--	--	--	--	--	--	--	--	--	--	11.50
Friedberg near Giessen	33.42	5.37	0.030	27.02	2.92	0.56	0.33	0.35	--	--	--	10.00	--	--	15.00

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5. Waldeck-Sauerland Alluvial [?] and Brown Iron Ores

(1) Alluvial [?]	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Christiane, ore	25.37	0.43	0.115	17.89	1.78	18.42	4.54	0.08	--	--	19.66		--	19.84	5.92
David, brown iron ore	23.67	2.02	1.560	23.37	--	5.62	--	--	--	--	--	--	--	--	8.29
washed	44.51	2.80	0.190	15.80	5.90	--	--	--	--	--	--	--	--	--	--
Grothenberg, fluorite ore	24.50	0.20	0.210	7.50	--	25.00	--	--	--	--	--	--	--	--	11.50
Christianesglück	28.57	2.02	1.560	23.37	--	5.67	--	--	--	--	--	--	--	--	--

6. Aachen-Eifel-Berg Brown Iron Ores on the Massive Limestone of the Devonian and Carboniferous

Cornelia near Aachen	43.10	1.50	1.50	12.80	5.50	2.3	--	--	--	--	12.37		--	--	--
Beuststollen	30.80	5.30	0.03	6.80	--	5.66	--	--	--	--	--	--	--	--	--
Stahlberg	36.22	6.95	0.13	22.40	0.78	--	--	--	--	--	--	--	--	--	--
Freilingen	13.90	0.86	0.21	9.20	3.30	33.60	1.50	0.04	--	--	29.00	1.60	--	10.00	2.30
Rohr, Eisenfley [sic]	14.36	0.68	0.09	2.00	--	40.38	--	--	--	--	--	--	--	--	--
Paffrath, brown iron ore	38-50	2-3	--	10-16	--	--	--	--	--	--	--	--	--	--	--
Ruppichteroth, brown ore	45	5-12	--	--	--	--	--	--	--	--	--	--	--	--	--

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7. Soonwald-Hunsrück Ores

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Waldagesheim	26.00	17.60	0.209	13.00	7.38	0.28	0.62	0.03	--	0.45	0.55	7.96	--	--	23.00
Märkerei, brown iron ore	40.90	0.30	0.550	23.05	5.60	0.20	0.18	0.21	0.0	0.17	0.60	9.20	0.38	25.60	7.60
Louise, red iron ore	52.13	0.17	0.040	20.30	2.50	0.30	0.25	0.03	--	--	1.20		--	--	7.00

8. Wiehen and Weser Mountains, Osnabrück Region

Wohlverwahrt, lumpy	12.31	0.09	0.180	11.84	2.74	35.33	1.80	0.02	--	--	30.00		--	--	1.99
fine	14.55	--	--	14.21	--	32.05	--	--	--	--	--	--	--	--	--
Nammen (Klipp.)	13.60	0.11	0.270	12.25	2.90	33.80	1.40	0.14	0.03	0.17	28.00	1.80	0.10	12.55	2.20
Porta, crude	22.85	0.30	0.510	15.26	2.68	9.56	2.50	0.50	--	--	24.85	--	1.70	--	370
roasted	31.10	0.43	0.620	19.05	10.56	11.55	3.29	0.63	--	--	1.00		1.98	--	--
Hüggel	29.57	1.74	0.040	8.30	4.00	15.90	3.60	--	--	--	25.03		--	--	9.40
Schafberg	46.44	1.73	0.024	16.40	1.56	0.74	0.25	--	--	--	17.70		--	--	8.40
Damme, crude ore	32.20	0.18	0.770	19.50	4.20	10.20	0.50	0.23	0.04	--	5.90	--	--	--	3.70
crude ore	21.60	0.12	0.610	24.40	7.30	16.40	1.60	0.23	0.05	--	--	--	2.40	--	--
Wet-mill concentrate I	41.40	0.20	0.910	13.50	4.40	5.40	1.60	0.15	0.07	--	--	--	1.50	--	--
II	44.50	0.28	1.130	11.80	7.10	3.30	1.10	0.23	0.08	--	--	--	1.20	--	--

9. Baden Dogger Ore Region

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Zollh. Blumberg, crude	22.30	0.16	0.52	26.25	9.80	15.00	2.10	0.33	0.07	0.40	8.50	1.70	2.00	28.80	9.60
roasted, fine	29.70	0.12	0.37	22.95	9.70	11.75	2.30	0.39	0.10	0.46	4.95	2.25	--	24.60	1.10
roasted, concentrate	38.60	0.12	0.47	18.70	9.10	9.30	1.80	0.18	0.12	0.63	3.40	1.05	--	20.00	2.50
Shönberg	20.50	0.12	0.24	14.90	4.95	23.80	1.80	0.06	0.04	0.45	18.70	5.00	0.55	15.30	7.40
Kahlenberg	17.25	0.22	0.25	13.40	3.40	30.10	0.90	0.04	0.03	0.15	22.70	2.50	0.40	13.75	5.40
Gutmadingen	23.90	0.25	0.44	21.80	9.20	11.80	2.10	0.53	0.08	0.06	10.55	6.22	--	--	9.18
Sehringen	15.34	0.21	0.34	8.85	3.74	34.17	2.61	0.06	--	--	27.46		--	--	5.46

10. Württemberg Dogger Ore Region

Geislingen, fine	27.60	0.37	0.330	28.70	6.70	7.30	1.10	0.07	0.38	0.38	8.20	6.00	0.50	31.50	9.90
lumpy	31.05	0.42	0.290	20.25	5.40	11.05	9.90	0.05	0.07	0.40	9.80	6.15	0.50	21.55	7.10
Faber du Faur	27.60	0.37	0.330	28.70	6.70	7.30	1.10	0.07	0.38	0.38	8.20	6.00	0.50	31.50	9.90
Wasseralfingen	29.80	0.33	0.260	32.07	7.08	5.60	1.60	0.08	--	--	6.53	5.61	--	32.3	5.61
Lower seam	28.10	--	--	37.58	--	3.35	--	--	--	--	--	--	--	44.3	--

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11. Bavarian Dogger Ore Region

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Staffelstein	38~~39~~.90	0.41	0.280	19.99	6.46	1.68	1.56	--	--	--	--	0.56	--	--	12.20
Langehöh	31.41	0.31	0.300	34.30	9.07	0.35	0.55	0.06	--	--	--	1.71	--	--	16.12
Hohenstadt V.	28.00	0.19	0.300	43.50	6.30	1.10	0.80	0.10	--	--	--	2.50	--	46.00	9.00
Pegnitz, crude	30.05	0.30	0.300	37.30	7.20	0.75	0.70	0.02	0.04	0.85	1.30	7.05	0.40	39.40	10.30
residual oversize	27.25	0.35	0.320	37.10	9.00	0.95	1.25	0.06	0.04	0.76	1.17	7.15	0.80	38.30	2.10
concentrate	39.50	0.36	0.360	20.25	8.20	0.65	1.00	0.04	0.06	1.05	1.40	8.70	0.50	21.25	2.30

12. Iron Ore Deposits in the Rest of Bavaria and in Spessart

Hollfeld, brown iron ore	38.00	0.34-1.82	0.29-0.41	19-30	4.5-7.1	0.06-0.22	--	--	--	--	--	--	--	--	--
Maffei, brown iron ore	50.00	0.30	0.85	13.50	1.50	0.45	0.20	0.20	--	--	10.50		--	--	8.00
white ore	32.50	1.10	1.00	24.00	3.01	3.00	0.80	0.10	--	--	20.00		--	--	9.60
Karoline Etmannsdorf	51.50	0.55	0.65	9.50	3.00	0.40	0.30	0.20	--	--	11.00		--	--	11.00
Auerbach-Leonie	30.00	1.10	0.08	21.50	3.00	3.50	0.80	--	--	--	20.00	--	--	--	9.00
brown iron ore	46.50	0.30	0.85	13.50	1.50	0.45	0.20	--	--	--	10.50	--	--	--	8.00
Sulzbach	51.00	0.60	0.80	9.00	3.00	0.50	--	--	--	--	11.00		--	--	10.00
Arzberg	35.50	1.60	0.15	13.00	2.50	3.00	0.60	0.30	--	--	26.00		--	--	3.00
Erzberg, Bavaria	46.00	0.23	0.88	18.06	3.50	0.50	0.40	0.10	--	--	9.70		--	19.00	8.00
Bieber, Spessart	26.00	8.50	0.27	20.20	3.80	1.90	1.00	1.45	0.00	0.12	3.33	13.70	--	--	18.70

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13. Red, Brown, and ~~Sparry~~ Spathic Iron Ores of the Harz Mountains

Friederike	25.90	0.20	0.48	11.70	6.60	18.20	1.20	0.18	0.06	0.24	17.50	5.70	0.60	14.00	7.80
Braune Stumpf	30.10	5.53	0.27	18.10	2.90	12.90	1.20	0.22	0.00	0.22	19.60	2.50	0.60	14.00	2.30
Hansa	19.30	0.22	0.21	11.45	3.95	23.60	3.95	0.36	0.05	0.17	24.10	4.30	0.44	12.40	7.70
"Büchenberg	31.40	0.28	0.35	16.05	5.01	20.13	0.55	--	--	--	23.80		--	--	--
Lerbach	25-40	--	--	35-45	--	3.5-8	--	--	--	--	--	--	--	--	--
Grosse Graben	34.20	5.12	0.25	6.00	2.20	10.40	1.10	2.81	0.03	--	19.20	2.60	--	9.60	2.20
	41.64	2.30	0.20	15.38	—	1.13	—	0.64	—	—	—	—	—	—	15.38
Pfaffenberg	29.00	5.48	0.01	9.00	1.35	8.20	1.10	0.78	0.02	--	34.00	0.50	--	9.60	0.30

14. Iron Ore Deposits in the Immediate ~~Harzian~~ Foothills of the Harz.

Echte	21.25	0.23	0.46	15.26	9.88	18.58	2.68	0.24	0.07	0.28	16.60	5.70	0.80	17.80	7.80
	20.90	0.20	0.45	15.50	9.80	18.70	2.60	0.25	0.06	0.28	17.00	5.20	0.70	17.40	6.00
Schandelah	21.56	0.40	0.66	28.35	5.80	13.45	0.95	0.27	0.00	0.35	9.20	7.55	0.75	30.25	16.50
Salzgitter Mixed ore	37.00	0.26	0.51	23.00	8.30	4.00	1.80	0.20	0.11	0.33	2.40	4.60	1.00	25.70	5.00
Fortuna, crude	22.90	0.18	0.40	27.30	6.20	2.20	--	--	--	--	--	--	--	--	11.80
Fortuna	35.80	0.20	0.57	20.50	8.02	2.65	1.45	0.12	--	--	--	3.67	--	--	10.02
Bismarck	36.71	0.20	0.40	18.00	6.00	4.40	1.50	0.24	--	--	--	2.78	--	--	6.49
Hannover Treue	27.65	0.16	0.36	25.15	8.40	6.50	1.90	0.31	0.12	0.58	7.30	6.88	1.65	30.70	8.10
Georg Friedrich	29.05	0.24	0.57	21.09	6.70	5.84	2.72	0.16	--	--	19.32		--	25.14	8.00
Ida concentrate	37.00	0.22	0.70	16.35	6.78	6.11	1.94	0.28	--	--	7.42		--	--	9.71

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Finkenkuhle	25.95	0.14	0.33	31.70	8.40	4.65	2.05	0.40	0.11	0.56	5.60	6.80	1.80	39.00	8.60
Lurgi concentrate	47.71	0.24	0.43	17.04	7.26	2.90	1.88	0.14	0.21	0.33	0.68	--	1.36	--	--
	30.71	0.17	0.031	38.59	7.06	5.12	1.99	0.30	0.12	0.28	1.16	--	1.83	--	--
Roasted ore	30.00	0.25	0.45	25.00	8.00	3.50	1.50	1.20	--	--	13.50		--	28.00	9.00
Bartelszeche	34.80	0.18	0.49	21.30	9.00	3.20	1.10	0.20	0.11	0.38	3.40	9.00	1.20	24.50	8.40
Haverlahwiese	30.30	0.13	0.43	24.80	9.20	4.00	1.50	0.46	0.12	0.46	4.20	7.10	--	31.90	9.60
"	27.70	0.21	0.44	23.80	9.30	6.80	2.00	0.41	--	--	14.9		--	27.00	8.00
Flachstockheim	28.00	--	0.40	26.00	9.00	5.00	--	--	--	--	--	--	--	--	--
Wortlah	40.28	0.21	0.45	22.68	8.90	4.75	2.15	0.10	--	--	--	--	--	--	--
Lurgi concentrate	38.8[illegible]	0.32	0.[illegible]97	16.22	6.62	4.86	1.40	--	--	--	--	--	--	--	6.0
Othfresen															

15. Iron Ore Deposits in the ~~Harz~~ Foothills of the Harz

Move Dictrict

Bülten-Ilsede	26.15	2.89	0.91	7.55	1.50	22.80	1.70	0.27	trace	0.10	18.27	5.20	0.35	8.00	8.30
~~Ilsede~~ Reichswerke mines	23.10	3.14	0.88	6.50	1.80	24.80	1.80	0.24	0.03	0.08	20.40	5.10	0.40	6.70	7.70
Lengede, Ilsede	35.70	0.46	2.05	7.04	2.90	12.20	1.10	0.15	--	--	--	--	--	8.40	--
Barbecke	27.24	0.35	1.90	13.34	3.10	18.54	1.26	0.10	0.03	--	--	3.46	0.40	--	9.54
Gifhorn	23-31	1.2-2.2	--	13-24	6.00	16-17	--	--	--	--	--	--	--	--	--
Stederdorf	23.97	1.35	1.53	4.99	1.91	26.12	1.45	0.07	--	--	--	--	--	--	26.35
	29.38	1.33	2.04	4.22	2.87	19.80	--	--	--	--	--	--	--	--	--
Markoldendorf	23.46	0.34	0.20	--	--	22.40	--	--	--	--	--	--	--	--	--
Marie Caroline	31.70	0.80	0.60	20.50	9.50	3.50	1.50	--	0.19	--	13.74		--	20.98	20

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Sommerschenburg	21.17	0.18	1.60	40.70	10.55	5.85	1.00	--	--	--	--	--	--	--	7.35
Rottorf near Kley	21.42	0.27	0.47	17.24	8.76	19. 23	2.00	0.05	--	--	--	8.50	--	--	10.73

16. Iron Ore Deposits of Thuringia

Arminius	30.20	3.82	0.031	15.30	1.10	0.90	0.40	3.52	--	0.07	1.00	6.40	0.50	37.50	--
Klinge	37.40	4.10	0.009	--	--	0.70	1.43	--	--	--	--	--	--	27.60	5 - 10
Mommel	36.74	4.44	0.030	9. 0	2.00	0.50	1.50	0.010	--	--	--	--	--	17-21	--
Stahlberg	38.10	5.54	0.010	7.00	2.50	3.00	1.50	--	--	--	--	--	--	12-20	--
Stuhl	49.00	0.30	trace	30.00	--	trace	--	trace	--	--	--	--	--	--	--
Friedrichroda	65.70	0.03	0.01	1.85	0.15	0.99	0.14	8.30	--	--	--	--	--	--	--
	42.00	0.01	0.01	2.63	0.03	0.21	--	4.73	--	--	--	--	--	--	--
Crux	39.00	1.20	0.07	--	--	--	--	--	--	--	--	--	--	25.00	--
Schmiedefeld chamosite, crude ore	33.00	0.80	0.40	15.00	8.48	3.00	1.68	--	--	--	13.00	--	--	--	6.44
roasted ore	43.00	0.40	0.70	17.00	11.00	6.00	2.00	--	--	--	--	--	--	--	--
Thuringite	31.00	--	--	22.50	16.90	--	0.12	--	trace	--	--	--	--	--	10.70
Kamsdorf	16.60	2.14	0.016	2.73	0.20	34.10	1.00	0.05	--	--	28.00	--	--	--	6.60
Lobenstein-Steben Spar	37.60	3.30	0.03	7.41	2.14	3.11	3.14	0.23	--	--	37.04		--	--	--
Brown iron ore	39.01	0.59	0.08	8.90	--	--	--	--	--	--	8.00		--	--	11.00
Gräfental	40.03	4.09	0.03	5.80	3.40	trace	5.35	--	--	--	--	--	--	trace	--
Lehesten	31.71	6.52	0.26	5.80	1.22	2.02	1.58	0.08	--	--	35.87		--	--	--

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(10)	(11)	(12)	(13)	(14)	(15)	(16)
roasted	42.00	8.00	0.30	7.00	1.00	2.00	2.00	-- --	--	--	--	--	--	--
Schleiz, red iron ore	32.00	0.40	0.13	14.00	4.85	25.00	--	-- --	--	--	--	--	30.2	--

17. Blackband Ironstone of Westphalia and Saxony

Westphalia	34.15	0.80	0.17	3.48	2.89	1.31	0.90	0.50 --	--	42.40		--	--	--
	33.77	0.95	0.25	11.13	6.18	3.64	0.28	2.64 --	--	25.50		--	--	--
	23.54	0.72	0.28	18.52	8.48	2.24	1.96	0.21 --	--	20.31	1.26	--	--	--
	42.59	0.60	0.30	1.62	1.63	1.75	2.29	-- --	--	35.92	0.45	--	--	--
Saxony	34.15	0.80	0.17	3.48	2.89	1.31	0.30	0.50 --	--	42.40		--	--	--
	33.70	0.95	0.25	11.13	6.18	3.64	0.28	-- --	--	27.50		--	--	--

18. Bean Ores

Mardorf	47.36	0.27	0.08	7.87	9.45	0.50	0.34	0.03	0.05	0.37	13.12	--	--	--
Rheinhessen	22.11	--	--	43.00	12.00	1.60	--	--	--	--	--	--	--	--
washed	40.00	1.70	--	24.00	10.00	0.40	--	--	--	--	--	--	--	--

19. Bog Iron Ores

Holstein	31.81	0.62	1.73	8.23	1.23	--	--	--	--	--	--	--	--	--

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TABLE 163

NUMBER OF BLAST-FURNACES PER MILLION TONS OF ~~CRUDE-ORE~~ PIG IRON AND PER YEAR

(Compiled from Stahl und Eisen /Steel and Iron/ 1947, no 5/6, by G. Bulle)

Metallurgical Plants (1)	Furnace Working Capacity (cubic meters) (2)	Burden Yield (Percent) (3)	Pig Iron (Tons per day) (4)	Number of Furnaces for each Million tons of Pig Iron per Year (5)	Remarks (6)
United States of America	~~large~~ blast furnaces				
Northern States	1250	46	630	5.07	
100 percent Mesabi ores	1250	--	1000	5.35	
Southern States 100 percent Alabama ores	1250	33.2	600	5.35	
~~Russia~~ USSR	standard furnaces				
Krivoy Rog	1160	33.5	1285	4.44	
Kamenskoye	1160	--	900	4.83	
Petrovsk	1160	37.0	695	4.60	
France, Luxembourg, Belgium					
Minette					
Crude Ore, few steps	670	30.0	250	9.55	
	542	26.5	--	10.95	Siliceous ore

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(1)	(2)	(3)	(4)	(5)	(6)
Ore, partially sintered	542	36.1	294	7.55	
Ore, roasted or sintered	615	36.5	410	5.41	
Crudd ore	615	28.0	300	6.30	
Ore, crushed, screened, fine ore, sintered	615	30.6	357	5.30	
Monnet Plan	---	--	500	---	
Great Britain					
Northampton ore	760	28.2	388	8.55	
Lincoln ore	--	25.2	237	7.40	
New construction plan, high-grade ores	--	--	550	4.00	Refers to average for 24 blast furnaces under the new construction plan
New construction plan, low-grade ores	--	--	--	6.70	
Germany, Ruhr	standard furnaces				
Imported ore	768	44.3	1029	2.90	
Roasted pyrites, sinter	525	51.6	610	2.22	Imported ores (Table 183)
Sieg (crude and roasted spar)	290	55.5	146.5	5.82	
Salzgitter, crude ore	840	44.1	294	12.80	
Ruhr, by comparison	840	41.2	---	4.30	Including Salzgitter

(1)	(2)	(3)	(4)	(5)	(6)
Crude ore and sinter	761	22.8	366	8.93	
Ore sinter - limestone	761	22.8	233	8.10	
Ore sinter with sintered limestone	761	24.8	288	6.53	
Porta, crushed crude ore, basic	508	27.7	200	12.00	crushed less than 120 millimeters
acid	695	21.1	384	6.03	crushed less than 100 millimeters, fine ore less than 8 millimeters
Calcined ore from graded crude ore, acid	695	26.4	450	5.82	
Dogger ore, Gutmadigen, crude ore	--	20.2	302	12.50	
sinter	487	25.6	200	11.80	
Belt sinter from fine ore	--	26.7	243	9.50	
Rotary furnace sinter from fine ore	--	28.5	315	7.05	
Wasseralfingen, crude ore	62	21.6	41	12.40	Experimental operation
Geislingen, crude ore	62	21.2	54	9.50	Experimental operation

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TABLE 164

THE IRON ORE RESERVES OF THE GERMAN REICH, INCLUDING THE EMERGENCY MINES

(in 1000 tons)

	1st Rate	2nd Rate	3rd Rate	Map in Atlas
Baden	30,000	350,000	400,000	74
Württemberg	--	50,000	100,000	74
Bavaria	53,000	60,000	100,000	74
Thuringia	35,000	70,000	300,000	75
Spessart	2,000	--	--	76
Lahn, Dill, and Upper Hesse	35,000	20,000	moderate	77, 78
Lindener Mark and Taunus, Soonwald	9,000	--	--	76 - 79
Westerwald	125	1,000	slight	80
Eifel	--	4,500	moderate	76
Waldeck, Sauerland	3,000	2,000	slight	73 - 83
Mountainous limestone region	2,000	3,000	--	73
Siegerland spathic iron ore	44,000	--	--	81
Weser range	10,700	211,000	moderate	82
Schafberg-Hügel	1,000	2,300	---	82
Bentheim-Ochtrup	--	--	very important	73
Damme in Oldenburg	40,000	30,000	moderate	73
Sub-Thuringian region				
a. Peine	65,000	85,000	slight	84
b. Salzgitter	50,000	800,000	910,000	85
c. Stederdorf	--	60,00	65,000	84
d. Other deposits in Lower Saxony	--	300,000	900million	87
North German minette-type deposits	30,000	20,000	--	86
Harz	30,000	2,000	--	88
Bog-iron ores and blackband iron ores	2,000	5,000	considerable	73
	443,825	2,075,800	considerable	73
	2,519.625 million		over 2,775 million	

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TABLE 165

(North Shipping from)
EXPORTED ORE OF GERMAN ORE DISTRICTS FROM 1937 to 1948

	1929	1937	1938	1939	1940	1941	1942	1943	1944
Siegerland	2,191,000	1,655,727	1,672,008	1,661,172	1,630,746	1,826,263	1,341,228	1,652,963	1,610,631
Lahn/Dill	698,000	822,896	929,451	1,049,740	1,075,451	991,948	863,798	808,128	684,269
Taunus/Hunsrück	271,000	216,190	237,600	223,345	236,875	244,406	267,671	296,773	----
Vogelsberg	549,000	134,566	134,884	127,501	V[sic]109,787	114,467	95,226	94,832	W[illegible]43, 385
Waldeck/Sauerland Weser range	22,000	280,590	558,641	677,459	1,427,529	1,271,205	826,249	402,678	284,851
Thuringia/Saxony	164,000	591,268	558,757	518,391	595,036	561,486	547,874	594,800	435,322
Bavaria/ Baden, Württemberg	616,000	1,664,193	2,755,331	818,782	4,705,926	4,132,082	1,657,324	1,682,400	---
Peine, Salzgitter Harz	1,538,000	2,949,316	3,945,936	1,045,461	7,249,429	7,098,474	7,111,753	8,086,101	6,878,595
Total:	6,374,000	8,314,746	10,782,708	6,121,851	17,030,779	16,240,331	12,711,123	13,619,475	9,937,653

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TABLE 165 -- Continued

British Zone	1946	1947	1948
Salzgitter District	1,458,520	1,337,228	2,210,924
Ilsede District	734,356	503,824	1,102,289
Other Harz foreland	250,397	351,382	659,633
Wiehen range, Osnabrück	775	4,814	22,057
Weser range	173,200	215,109	544,352
Sauerland	9,722	17,942	25,401
Siegerland	103,411	190,117	323,819
Total I:	2,730,381	2,620,416	4,888,475

United States Zone	1946	1947	1948
Bavaria	226,491,	377,491	477,179
Baden	shut down	--	--
Württemberg	136,100	189,876	267,881
Lahn/Dill	258,624	397,000	498,500
Waldeck/Sauerland	15,616	23,974	30,622
Vogelsberg/ Lower Hessian lowland	274,960	360,341	452,175
Total II:	911,791	1,348,672	1,626,357

French Zone	1946	1947	1948
Siegerland	122,390	--	--
Baden	56,395	--	--
Taunus/Hunsrück	19,689	22,689	17,922
Total III:	198,474		

1949: British Zone 5,971,006; United States Zone 2,061,329; French Zone 1,079,571 tons -- Total 9,111,906 tons.

TABLE 166

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IRON ORE IMPORTS OF ALL COUNTRIES IN THE PERIOD FROM 1935 TO 1938

(in tons)

Importing Countries	1935	1936	1937	1938
Germany	13,839,002	18,177,642	20,621,000	21,569,000
Great Britain	4,546,937	5,960,385	7,196,000	---
Canada	1,348, 154	1,175,922	1,210,000	---
Belgium/Luxembourg	10,415,653	10,548,858	12,410,000	---
Japan	3,350,335	3,720,408	5,500,000	---
United States	1,492,435	2,232,229	2,481,000	---
France	435,810	385,340	921,000	---
Netherlands	418,214	480,977	610,000	---
Poland	240,121	340,436	651,000	---
Czechoslovakia	540,320	546,139	1,500,000	---
Hungary	262,467	350,697	233,000	---
Italy	184,005	39,612	184,000	---
Switzerland	42,951	49,275	---	---
Other countries(1)	95,153	58,514	---	---

(1) These importing countries are Austria, Finland, Norway, Sweden, Rumania, Spain, Yugoslavia, Algeria, Tunisia, Turkey, China, and Korea.

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TABLE 167

IMPORTS OF IRON ORE BY GERMANY (in 1000 tons)

From	1913	1929	1932	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1948	1949 (2)
Sweden	4,558	7,382	1,578	5,158	5,561	8,131	10,230	8,992(1)	10,038	8,418	9,260	7,975	9,540	1,750	3,159
France	3,811	3,253	716	1,613	6,614	6,860	5,740	5,056	2,624	--	6,486	7,351	7,902	--	316
Spain and Spanish Morocco	3,632	3,025	460	634	1,321	1,068	311	1,807	738	5	170	729	456	--	168
Norway	303	688	220	529	515	527	510	1,118	1,031	124	391	490	292	--	176
Belgium/Luxembourg	127	273	2	85	363	565	1,470	1,718	1,568	629	--	--	--	100	292
Greece	147	107	78	84	199	182	219	249	--	10	--	21	--	--	--
Newfoundland	121	750	191	342	189	171	809	1,122	836	--	--	--	--	100	100
Algeria	481	784	147	188	213	531	725	755	2,012	--	102	270	--	35	--
Tunisia	136	313	20	14	17	62	52	290		--	6	4	--	--	--
Sierra Leone	--	--	--	--	68	165	214	462		--	--	--	--	100	214
Other Countries (3)	702	72	24	2	33	25	93	--	664	791	966	1,002	1,328	300	190
Total:	14,018	16,647	3,436	8,643	15,102	18,521	20,373	21,569	19,649	9,977	17,381	17,820	19,528	2,385	4,515

(1) Of this, 23.24 percent originated from German-owned mines.

(2) See also Tables 109 and 170. The 1949 column is not yet complete

(3) Russia, Austria-Hungary, British India, Switzerland, Greece, Brazil.

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TABLE 168

GERMAN IRON ORE CONSUMPTION (in 1000 tons)

Iron ore Production and Imports

Year	Production	Imports	Total
1900	12,792	--	12,792
1904	15,700	6,061	21,761
1905	16,848	6,085	22,933
1906	19,506	7,630	27,136
1907	20,204	8,476	28,680
1908	18,530	7,733	26,263
1909	20,129	8,367	28,496
1910	22,965	9,817	32,782
1911	24,319	10,821	35,140
1912	27,197	12,124	39,321
1913	28,608	14,024	42,632
1920	6,362	5,915	12,277
1921	5,907	6,251	12,158
1922	5,928	11,014	16,942
1923	5,118	2,377	7,495
1924	4,457	3,076	7,533
1925	5,923	11,540	17,463
1926	4,793	9,553	14,346
1927	6,626	17,409	24,035
1928	6,475	13,794	20,269
1929	6,374	16,952	23,326
1931	2,621	7,071	9,692
1932	1,340	3,452	4,792
1933	2,592	4,572	7,164
1934	4,343	8,265	12,608
1935	6,044	14,061	20,105
1936	7,570	18,469	26,039
1937	9,792	20,621	30,413
1938	14,151	21,928	36,413
1939	5,122	19,649	25,771
1940	17,031	9,977	27,008
1941	16,240	17,381	33,621
1942	12,711	17,820	30,531
1943	13,619	19,528	33,147
1944	9,937	9,581	19,512
1945	--	--	--
1946	3,582	--	3,582
1947	3,891	3,105	6,996
1948	6,534	2,385	8,919
1949	9,112	4,600	13,712
1950(1)	10,000	5,000	15,000
1951 (1)	15,000	8,000	23,000

(1) Planned ~~Estimated~~ for Western Germany (~~without~~ not including the Saar).

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TABLE 169

GERMAN PIG IRON PRODUCTION
(in 1000 tons)

Year (1)	Production
1861-1865	799
1866-1870	1,243
1871-1875	1,546
1876-1880	2,177
1881-1885	3,410
1886-1890	4,215
1891-1895	5,082
1896-1900	7,446
1901-1905	9,472
1905-1910	12,882
1911	15,468
1912	17,617
1913	19,312
1914	14,408
1915	11,745
1916	13,293
1917	13,171
1918	9,208
1919	5,654
1920	6,388
1921	7,855
1922	9,195
1923	4,941
1924	7,833
1925	10,089
1926	9,636
1927	13,089
1928	11,804
1929	15,506
1930	11,607
1931	7,579
1932	5,282
1933	6,859
1934	10,567
1935	12,842
1936	15,301
1937	15,938
1938	15,663
1939	17,478
1940	13,955
1941	15,433
1942	15,411
1943	18,972
1944	13,369
1945	800
1946	2,322
1947	2, 393
1948	4,610
1949	7,140

(1) Averages used for the years 1861 to 1910

TABLE 170

SWEDISH IRON ORE EXPORTS AND GERMANY'S SHARE OF THEM

Year (1)	Total Swedish Iron Ore Exports (in tons) (2)	Amount which went to Germany (in tons) (3)	German Share in Total Swedish Exports (percent) (4)	Swedish Share in German Iron Ore Imports (percent) (5)
1909	3,196,453	2,519,048	78.8	34.4
1910	4,413,600	3,276,605	74.2	33.1
1911	5,086,898	2,776,466	54.6	32.4
1912	5,520,653	4,217,958	76.4	32.0
1913	6,439,750	4,977,395	77.3	32.5
1914	4,787,314	3,677,671	76.8	--
1915	5,992,215	5,122,035	85.5	--
1916	5,536,641	4,298,586	77.6	--
1917	5,818,498	4,824,748	82.9	--
1918	4,463,760	3,704,604	82.9	--
1919	2,416,856	1,487,634	61.6	39.1
1920	3,728,623	3,161,502	84.8	36.3
1921	4,337,043	3,253,333	75.0	29.1
1922	5,322,047	4,585,920	86.2	45.3
1923	4,958,016	2,508,880	50.6	52.8
1924	5,947,593	4,017,634	67.6	66.6

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(1)	(2)	(3)	(4)	(5)
1925	8,800,366	6,972,966	79.2	57.5
1926	7,655,521	6,029,231	78.8	60.9
1927	10,715,765	8,221,610	76.7	49.9
1928	6,092,948	3,518,362	69.1	26.4
1929	10,898,968	7,995,258	72.9	43.5
1930	9,386,518	6,662,519	71.0	48.4
1931	4,496,275	2,497,776	55.6	39.6
1932	2,219,309	1,552,885	70.0	45.7
1933	3,150,636	2,253,435	71.5	49.4
1934	6,870,134	5,157,759	75.1	55.8
1935	7,718,892	5,509,300	63.0	39.2
1936	11,999,000	8,131,000	67.7	43.9
1937	13,965,000	9,084,000	59.3	40.2
1938	12,685,000	8,992,000	69.1	40.7
1939	13,799,000	10,038,000	72.5	51.0
1940	9,995,000	8,418,000	84.2	84.5
1941	9,396,000	9,260,000	98.9	51.9
1942	8,491,000	7,075,000	94.2	48.8
1943	10,192,000	9,550,000	93.7	46.9
1944	4,491,000	2,514,000	55.5	26.2
1945	1,229,000	--	--	--

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(1)	(2)	(3)		(5)
1946	5,242,000	---	--	---
1947	8,500,000	47,000	0.55	--
1948	12,000,000	175,000	14.60	73.4
1949	---	3,159,000	--	--

RESTRICTED

(1)	(2)	(3)	(4)	(5)
1946	5,242,000	---	---	---
1947	8,500,000	47,000	0.55	--
1948	12,000,000	175,000	14.60	73.4
1949	---	3,159,000	--	--